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VIEWS, NEWS AND INTERVIEWS.

One of the indirect results of the adoption of electricity for the execution of criminals is the consideration of its suitability for superseding the poleaxe for the killing of cattle. Humanity can be as well served by the use of electricity in public slaughter-houses as in prisons, and the question is shortly to be set at rest in Scotland. The abattoir at Aberdeen is about to be lighted by electricity, and as soon as the alternating plant which will be employed is installed a trial will be made of the capabilities of the electric current for dispatching oxen. If it is proved that the current has no detrimental effect on the quality of the meat, it is anticipated that this new application will soon become general.

"Strange how slow some people are to find that times are faster than they used to be," said a resident of Avondale, one of Cincinnati's suburbs. "Here I had to send a district messenger out to Avondale the other day and I was charged for the old horse car rate. I went and kicked, and explained that since the electric cars were running the time to and from Avondale had been cut in two. Oh, yes, I made my point. They reduced the sum they had charged me exactly one-half, so I got a rapid transit rate."

The Independent Gun Club, of Cincinnati, the oldest organization of the kind in the State of Ohio, recently decided to make its grounds the representative one for shooting for recreation purposes. Visiting shooters at the opening on April 12 will open their eyes at what has been done. Little shows above ground, however. Electric apparatus for springing the traps cost $500.

The police department of Cincinnati is truly progressive. The work-house van will be so built that it will run on the street car tracks. It will be hitched to a street car at Ninth street, taken over to Elm and then hustled out to the works by an electric car. This is an era of reform, verily.

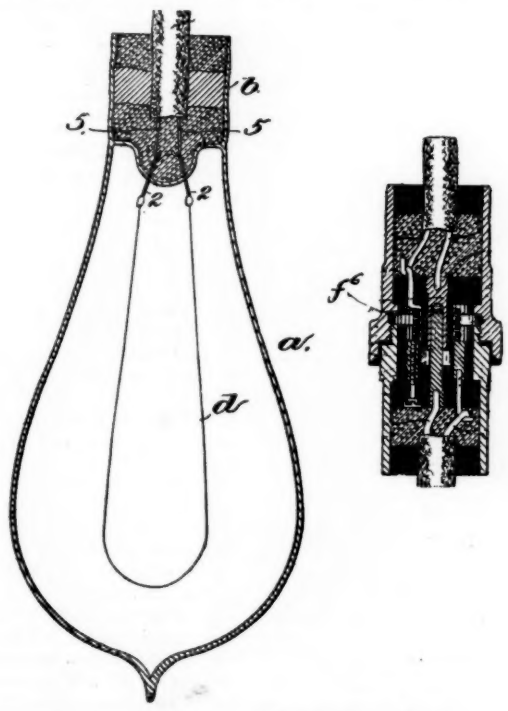
The officials of the World's Fair claim that the electric light combination is extortionate in its proposed rates for lighting the Fair grounds. An electrical expert has been sent to Europe to secure bids for service from foreign exhibitors. The officials declare that they will use gas, if necessary, to defeat the so-called "trust."

A sensation came to the surface as the jockeys were weighing in after the third race at the Guttenburg, N. J., track last Friday. Gyda's jockey, Cook, weighed nine pounds overweight. His clothing was inspected and an electric battery was found inside of his silken jacket. Wires were strung from the battery down the boy's legs and were connected with the spurs of the lad's boots. By means of the battery the rider could give the horse a series of shocks of electricity. When Gyda won at 100 to 1, some time ago, it was said that the battery was used. An investigation by the executive committee was held after the last race, and the boy and all concerned ruled off the turf. It is said that the electric battery has been frequently used at both Guttenburg and Gloucester.

Oil for Fuel at the World's Fair.

Oil is to be used as fuel, instead of coal, in all the big furnaces at the World's Fair grounds. A contract was practically made last week with the Standard Oil Company for furnishing the entire supply. The Standard Oil Company sent in a bid a few days ago that made the coal dealers who were after the contract very anxious. The lowest bid for coal was $2.44 per ton. From that figure the bids ranged all the way to $3.95 per ton. The Standard Oil Company's bid was 70 cents for a barrel of forty-two gallons of oil, and 72½ cents a barrel during 1893. Agents of the company said that three barrels of oil would produce as much heat as a ton of coal. That meant a saving of about 14 per cent. on the lowest bid for coal, and a committee decided in favor of oil, on one condition. The Exposition Company will pay 70 cents a barrel until 1893, and then have the privilege of getting the oil at the lowest market price, not to exceed 72½ cents a barrel. The proposition will probably be accepted by the Standard Oil Company.

The contract will be for, perhaps, the largest quantity ever sold to one consumer. The lowest estimates that have ever been made of the amount of coal that would be burned at Jackson Park during the Exposition was 75,000 tons. On this basis 225,000 barrels of oil would be used, but it is probable that the amount will be largely in excess of that estimate. The oil is to be delivered at Jackson Park in quantities to suit the construction department. Mr. Burnham told the members of the committee that oil had been successfully used for years by several of the largest power houses in Chicago, notably the cable lines.



STEAM AND WATERPROOF INCANDESCENT LAMP.

A $2,000,000 Electric Railway Contract.

Brooklyn has come to the front with a rush on the question of electric traction, and her two leading street railway companies have recently placed the largest orders ever yet given in this line of electrical equipment. The Brooklyn City Railroad Company, of which Mr. D. F. Lewis is the head and front, contracted a short time ago with the Thomson-Houston Electric Company, of Boston, Mass., as already mentioned in the columns of the REVIEW, for the entire equipment of their lines, and the order is sufficiently large to tax the utmost capacity of the company for the next six months.

The contract for the equipment of the Atlantic avenue system has gone to the Westinghouse Electric and Manufacturing Company, of Pittsburgh, Pa., and in a recent interview President William Richardson stated that it will approximate $2,000,000. The Westinghouse Company are to furnish 200 motors of 30 horse-power each for the cars, and generators of from 250 to 700 horse-power, making in all 2,000 horse-power. One hundred of the motors are to be delivered in June, and the balance before December. The generators are required in from 60 days to four months time. One hundred cars have also been ordered, 50 to be ready by July and the balance to be delivered thereafter as required, the whole order to be completed before December.

Work on the power house at Second avenue and First street will begin next week, and on the Fifth avenue, Washington street and Atlantic avenue lines, almost immediately. The Fifth Avenue road, between Twenty-seventh and Thirty-sixth street, is to be finished by April 28 next.

Steam and Waterproof Incandescent Lamp.

We illustrate herewith a lamp and coupling invented by I. J. Flagg, of Clinton, Mass., which was recently patented. The lamp is designed to be steam and acid-proof, permitting its use without outside protection in dye-houses, bleacheries and damp places, where vapors are absorbed by the plaster-of-paris ordinarily used which tend to short-circuit the lamp. It is claimed that this lamp can be used in steam or under water with perfect success.

As shown in the engraving, it comprises an ordinary lamp without the usual socket, a glass cylinder marked *b* being fused to the stem, the junction of the platinum wires with the leading-in wires being buried in a non-conducting waterproof cement, such as tar or pitch. Over this is put a layer of plaster-of-paris to insure adherence to the side walls of the glass, and then another layer of pitch. A socket may or may not be used in connection with the lamp.

In the detached view is shown a socket especially designed for use therewith. It comprises two portions, one of which is fixed to the leading-in wire *e* connected to the platinum terminals, and the other of which is adapted to be connected therewith by a screw joint. In both views the conductors are buried in moisture-proof material protected on either side by rubber plugs. In disconnecting the lamp from the socket for the purpose of renewal, the upper portion of the socket is unscrewed, a sliding connection between the central electrode and the flexibility of a coiled wire marked f^6 permitting the unscrewing of the upper half of the socket.

It is claimed that lamps as thus constructed, when used in steam or under water, have as long a life as an ordinary lamp used in a store or office. The lower half of the coupling is really the top or base of the lamp, and when the filament wears out it is necessary only to unscrew it from the other section of the socket. The socket may be in some instances dispensed with as it is not a difficult matter to disconnect the lamp from its leading-in wires and reconnect a fresh lamp. The plaster-of-paris is thoroughly protected from the effects of moisture. In case the socket is used it will last indefinitely and may be used over and over again with fresh lamps.

The Bigelow Carpet Company, of Clinton, Mass., have given this lamp a severe test, the inventor having installed a 100 light plant in their dye house a year and a half ago, which has given perfect satisfaction. A lamp is also now running which has been under way 10 months, burning 11 hours out of every 24. The lamp is designed especially for use in dye houses, breweries, power mills, tunnels, mines, buoy lighting and under water.

Thomson-Houston Annual Meeting.

The annual meeting of the stockholders of the Thomson-Houston Electric Company will be held on Monday the 11th day of April, 1892, at 1.15 o'clock in the afternoon, at 93 Main street, Middletown, Conn. The transfer books will be closed from April 2 to April 11, both days inclusive.

Dr. Philip Ten Eyck.

HE WAS AN ASSOCIATE OF THE FAMOUS JOSEPH HENRY.

In a comfortable house on one of the streets in this city, a short distance south of the capitol, there resides a venerable citizen, whose services in the scientific world, particularly in the field of electro-magnetism, entitle him to much more notice than we shall be able to give in the brief biographical sketch that follows:

Philip Ten Eyck, a descendant of Coenradt Ten Eyck, who came to this country from Holland in 1650, was born in Albany, N. Y., on the 10th day of March, 1802. At this period Albany still retained many of its Dutch customs and manners, although English rule had been dominant for more than a century. Dutch was the prevailing language, and the Book of Common Prayer, in the Dutch language, was as much used in the English church as was the English version of the same book.

In 1813 the Albany academy was incorporated, but with the characteristic slowness of the Dutch city it was not until two years later that the first class was organized, quarters having been secured in an old wooden building that stood on the southeast corner of State and Lodge streets.

Philip Ten Eyck was a pupil of the academy at its inception, and of 92 boys who were members of the school the first year, he is believed to be the sole survivor. Before this, however, young Ten Eyck attended the schools of the city which were at that period as good as, if not superior to, the schools of other places, a field in which Albany has always taken the lead. After taking a course at the academy, he was sent to Hamilton college, where he was graduated in 1820. In this connection Prof. Edward North, of Hamilton college, writes, under date of February 13, 1892: "Dr. Ten Eyck is now the oldest living graduate of Hamilton; he was graduated in 1820, and is the only survivor of a class somewhat distinguished in the annals of the college. One of his classmates, Prof. Charles Avery, held the chair of chemistry and natural philosophy in Hamilton for 35 years; another, the Rev. Albert Barnes, was the author of 11 volumes of 'Notes on the New Testament,' of which not less than 1,000,000 copies had been sold previous to his death, in 1870; another, Henry Wales, was drowned within a month after his graduation in saving the life of a young lady who, tradition says, was betrothed to him, and who lived a long life of unwedded beauty."

Upon Ten Eyck's return to this city he was urged by his father to select the practice of medicine as a profession, and, with that object in view, commenced his studies with Dr. James MacNaughton, an eminent practitioner of that period. In the usual time Ten Eyck was a full-fledged doctor, fortified with a diploma.

During the days of his boyhood he was the daily companion of Joseph Henry, who was also a native of this city. They played together, and went to school together, and, excepting the period that Ten Eyck was at college, the years of early manhood were spent in companionship.

In the year 1826 Henry was appointed professor of natural philosophy and mathematics in the academy. Ten Eyck at this time was a young doctor with considerable professional business, which was gradually increasing. But rolling pills and mixing decoctions did not rise to the need of the ambitious inclinations of this young disciple of Æsculapius, for his spare moments were spent in the laboratory of the academy, in the company of Henry, where he reveled in the pleasure of the study and investigation of matters pertaining to the natural sciences. In time his patients suffered through neglect, and, not being dependent upon his practice for a living, he abandoned his profession and devoted his time thereafter to work in the laboratory.

While Henry was engaged in the upper rooms instructing his classes in the mysteries of natural philosophy, Ten Eyck was in the basement experimenting with the crude instruments that he had at hand. As opportunity offered between classes and after school hours, Henry would run in to see how Ten Eyck was progressing. The suggestions that led to the experiments in electro-magnetism were of the united minds of Ten Eyck and Henry. Ten Eyck borrowed 1,000 feet of copper wire from the firm of Pruyn, Wilson & Vosburgh, hardware merchants on State street, and arranged it around the upper room of the academy, known as the chapel. Ten Eyck got the instruments in order and made the first experiment by which a current was passed through the wire that sounded the alarm bell that electrified the world. When Henry heard the alarm, to use Dr. Ten Eyck's language, "Henry was wild when he heard the sound of the bell." There are substantial reasons for believing that these experiments would not have been successful without the unremitting labor of Ten Eyck.

The apparatus used is described by Prof. Henry as follows: "I arranged around one of the upper rooms in the Albany academy a wire of more than a mile in length, through which I was enabled to make signals by sounding a bell. The mechanical arrangement for effecting this object was simply a steel bar permanently magnetized, of about 10 inches in length, supported on a pivot, and placed with its north end between the two arms of a horse-shoe magnet. When the latter was excited by the current, the end of the bar thus placed was attracted by one arm of the horse-shoe and repelled by the other, and was thus caused to move in a horizontal plane and its farther extremity to strike a bell suitably adjusted."

Regarding this experiment Prof. A. M. Mayer says: "This was the first electro-magnetic telegraph which had worked through so great a length of wire; it was the first telegraph in which an electromagnet had worked successfully; it was the first sounding electric telegraph."

Another authority says: "The thing was perfect, as it came from its author, and has never been improved, from that day to this, as a sounding telegraph."

In November, 1832, Professor Henry resigned his professorship in the academy and accepted the professorship of natural philosophy in the College of New Jersey, at Princeton. Dr. Ten Eyck was selected to fill the vacancy, which he did with rare ability and distinguished honor, until 1848, when he retired to private life. Being possessed of sufficient income, he has since that time devoted himself to the business of his estate and quiet scientific research.

Though Dr. Ten Eyck's brain and hand had largely to do with the great discoveries in electro-magnetism, it seems somewhat strange that Professor Henry never made any public acknowledgments of the great assistance rendered him by his early friend and associate.

Dr. Ten Eyck has been so modest and so indifferent to his claims in connection with this matter that he has repeatedly refused to be interviewed on the subject; but there are a score or more of old residents of this city, who were students at the academy at that time, who remember the circumstances which culminated in the great discovery in 1831 and the part taken in it by Professor Henry and Dr. Ten Eyck, respectively.

On the southeast corner of the academy there is a bronze tablet, placed there in 1886 by the bi-centennial committee, that bears the following inscription: "Joseph Henry. An eminent discoverer and leader in science. Born in Albany in 1799. Died in Washington in 1878. His experiments in electricity were made in this building while professor of mathematics. 1826–1832. In 1846 he was appointed the first secretary and director of the Smithsonian Institution. To his discoveries in electro-magnetism the world is indebted more than to any other man for the possession of the telegraph."

It has been said that Morse appropriated the glory that fairly belonged to Henry. It can be said, also, that Henry appropriated the glory that, to a certain extent, belonged to Ten Eyck. To say the least, a great injustice has been done to Ten Eyck, and the bi-centennial committee have presumably unconsciously added to it by not placing upon the tablet the name of Philip Ten Eyck also.

In the memorial address delivered by Dr. Edward N. Dickerson, June 16, 1885, presenting to Princeton college a tablet designed to commemorate the contributions to the electric telegraph of Professor Henry, the learned doctor, in referring to the means possessed by Henry as compared with those possessed by Faraday, pays this honest tribute to Dr. Ten Eyck: "For thirteen years Faraday had been pursuing his investigations amply supplied, and was in the full career of successful experiment when, in 1826, his great rival first looked upon the course over which he was to run; and even then Henry had to depend upon the meagre facilities of the Albany academy, and the voluntary assistance of an appreciative physician, Dr. Philip Ten Eyck, of Albany—a name to be held in grateful remembrance by all who feel a pride in the achievements of the great scientist whose early efforts were assisted, and whose hopes encouraged, by this enlightened friend."

We have given thus briefly a faint outline of one of Albany's most eminent men. One who, like many others, has sown the seed that another's hand has reaped; one to whom, nevertheless, the grateful thanks of this and coming generations are due.

"Like the liberal gods,
From his own gracious nature he bestows,
Nor stoops to ask reward."—*W. W. Crannell in Albany Evening Journal.*

The director of a telephone company in Vienna, Austria, has been removed and is under investigation for listening at the telephone whenever the emperor, his ministers, or the big financial men of the city, were talking. He is supposed to have used the information thus obtained for purposes of speculation or blackmailing. His enterprise will probably be diverted into other channels in the future.

Luminosity in Electrolytes.

In a communication recently made to the Académie Royale de Belgique, Professor Lagrange and M. Paul Hoho describe some experiments made by them on a luminous and calorific phenomenon which takes place under certain conditions when a current is passed through an electrolyte. The phenomenon was first observed in 1844, by Foucault and Fizeau, and has, subsequently, also been investigated by Righi, Colley, Planté and others. Professor Lagrange and M. Hoho employed in one experiment a 10 per cent. solution of H_2SO_4, the positive electrode being of copper with 180 square centimetres in the liquid, the negative electrolyte being a copper wire one-quarter millimetre in diameter plunged into the electrode to a depth of one-half millimetre. Current was obtained from a battery of accumulators. At first only an ordinary phenomena of electrolysis are observed; then, as the volts are increased, bubbling and boiling occur at the negative electrode, next intermittent arcs take place between wire and liquid, finally a luminous cylinder is formed, having the copper wire for axis, the current then becomes steady and the resistance very high. On plunging the wire further into the liquid this series of phenomena can be reproduced. Much the same effects were produced with platinum, zinc, tin, iron, steel and carbon electrodes of different diameters, with sulphuric acid solutions of different strengths, and with a chloride of sodium solution. The production of the luminosity is accompanied by an abnormal resistance, which is localized round the negative resistance; with electrodes 29 centimetres apart, practically all the fall of potential takes place within five millimetres of the negative electrode. The shape of the negative electrodes appears to have but little influence. Luminous effects can be made to occur also at the positive, but with some difficulty. It is, however, impossible to produce luminosity at both poles at the same time.

Gas and Electric Light.

The seventh annual report of the Massachusetts Gas and Electric Light Commissioners has appeared. There are now 131 companies under supervision of the Board, 26 of which supply both gas and electric lights, 58 only electric light and 47 only gas. The Board calls attention to the failure of many companies to make returns, and asks for legislation imposing a penalty in case of non-compliance with the law.

During the year 1891 five persons were injured by electricity from electric wires, one of them fatally. Thirty persons have been injured by illuminating gas, 16 fatally. Of the latter, two committed suicide. Of the fatal accidents from gas, two occurred where oil gas is made, six where coal gas only is made, 71 in places where there is only water gas and 99 where both coal and water gas are used.

Of all the companies, seven appear not to have earned expenses and 12 others have not earned sufficient to warrant a dividend. The receipts for gas sold by meter show an apparent increase of $608,000, but the sales made by various Boston companies to one another, and thus counted twice as sold, reduce this amount to $8,000. Receipts from public lamps show a decrease of about $35,000.

The value of the gas plants, as assessed by local assessors, is, in round numbers, $14,000,000. The total sum paid by the companies for taxes was $272,709.78, an average of 7 per cent. per 1,000 feet of gas sold; being an increase of $2,785.02 over the previous year, and a decrease of 1.2 cents per 1,000 feet sold.

The price of gas has been reduced during the year in Brookline, Wakefield, Dorchester, Malden, Roxbury, South Boston and Springfield, and raised in Spencer from $1.25 to $1.60. The average price for coal in 1886 was $1.72; in 1887, $1.66; in 1888, $1.56; in 1889, $1.45; in 1890, $1.39; in 1891, $1.31—a steady gain for the consumer.

During the year, 51 companies laid 49 miles of mains, varying from less than 100 feet to nearly eight miles.

The electric light companies exhibit assets of $9,931,887.66, and liabilities of $9,537,311.08, an apparent surplus of $394,576.58, and an actual surplus of $474,826.55, equivalent to about 9 per cent. on capital invested.

Dynamic Induction at High Potentials and Frequencies.

BY PROF. ELIHU THOMSON.

It is the purpose of the present writing to supplement the experiments which were described by me a short time since, in which condenser discharges at comparatively high potentials were used to induce, by dynamic induction, similar discharges in parallel circuits or coils.

The application of the principle to the production of an efficient lightning protector, or device affording a selective path for high frequency discharges, has already been pointed out. So also the effects of the use of varying numbers of turns in the coils under induction have been shown, effects which have enabled me up to the present to obtain sparks of over 31 inches in length in free air between ball terminals about one inch in diameter, and in an apparently continuous stream of not less than 250 per second. These sparks are bluish white, like Leyden jar discharges, and are accompanied by a loud rattle or roar. These effects and their bearing on insulation will be further adverted to.

The following experiment is an exceedingly instructive one, as showing the means I use for obtaining a balance of electromotive forces or selective path.

Two coils of heavy wire are wound, each having about 12 to 15 turns, more or less. The coils are separated by a glass cylinder, one coil being in the interior of the cylinder and the other being wound outside thereof. Connections are made as in Fig. 1. The turns of the coils should be kept apart or well insulated from one another. An incandescent lamp L is put in circuit with one of the coils, as the outer one, by putting one terminal of the lamp in connection with one end of the inner coil and the other lamp terminal to one end of the outer coil. The wires *a b* permit condenser discharges to be passed through the inner coil; a branch wire C is taken from *b* and its free end can be connected to any part of the outer coil, so as to include more or less of the turns of the outer coil in a branch with the lamp around the inner one. With, say, 12 turns in the inner coil, and a possible change of the turns of the outer coil from none to 15 or 16, and passing condenser discharges over an air gap at J, with an air blast playing on the spark to prevent continuous arcs when the condenser charges are furnished by the high potential secondary of an alternating current transformer, the lamp at L would be lighted to a greater or less brilliancy according to the turns of the outer coil in use. In applying the movable wire to the outer coil at a certain point, there is found to be no current passing in the lamp, and on passing this wire either way from this point so as to include more or less of the outer turns, the lamp is lighted with a gradually increased brilliancy as the neutral point is more and more departed from. Of course, a current indicator, provided it responds to currents of excessive frequency, may be substituted for the lamp. This experiment shows in the clearest manner the fact that a selective path for the discharges of high potential is obtained in adjusting the relative number of turns in the outer and inner coils.

I have in a previous communication stated in what way this combination of inductive coils has been applied as a lightning arrester or protective apparatus for dynamos, motors, transformers, etc. Varying the spark length at J or the condensor capacity does not, so far as has yet been determined, disturb the relations found. It is, of course, necessary that the two coils be well insulated from each other, and this can easily be done by immersion in oil or separating them by glass, hard rubber, or the like.

I will now describe certain forms of apparatus which are adapted for obtaining at will very high potential discharges. In fact, I have been able easily to obtain from about 1,600 feet of wire sparks of over 31 inches between the discharge balls. So far as can be estimated from available data, these sparks are due to potentials of not less than half a million volts.

In Fig. 2, B is a barrel of lubricating oil, an oil of high insulating qualities, being, in fact, a liquid paraffine. The top of B is open and in it are immersed the primary and secondary coils P and S, each wound on a paper cylinder. The cylinder on which S is wound is about three inches smaller in diameter than the other and has an external diameter of about 13 inches. It is covered with two layers of silk, and upon this is wound 500 turns of No. 26 cotton covered wire in one layer, with a silk thread between the turns. This layer covers about 20 inches of the length of the cylinder. The terminals of this fine coil are carried out, respectively, through the lower head and up through the oil above, as will be described.

The primary P consists of 15 turns of a conductor composed of five rather heavy wires laid alongside, and the connections are made by carrying the terminals outside at C, keeping them about two inches apart. The wire leaving S downward, goes to a rod which rests in a cup in the center of the bottom head of the barrel. This cup has a rod extending down through a glass cylinder filled with oil which dips in a horizontal trough of oil T^1, through the center of which is carried a prolongation of this rod to conduct the discharges to the lower discharge terminal D^1.

The upper end of S is treated in a similar way, passing up through a cork in a glass vessel, such as an inverted bottle with the bottom perforated, then horizontally in the trough T of oil to the sleeve G, through which a hollow brass bar D with rounded ends may be slid up or down. For this purpose a string and pulley with counter weight W may be provided. The bar D should be, say, an inch in diameter, to avoid brush discharges from its sides, and, in fact, its upper end should be covered with a bottle of oil or have a large polished ball, otherwise large brush discharges will pass into the air from it. By means of a condenser and spark gap, with a blast of air blowing across the gap, the apparatus may be used to obtain the high potential and high frequency sparks. The charging of the condenser is from the secondary of a high potential induction coil, giving about 15,000 to 20,000 volts, the primary of which coil is fed from alternating current mains. The condenser used in the experiments consisted of 16 Leyden jars of about a gallon each, which was all there was at command. This will be replaced by a special condenser adapted for such work. The discharges from the apparatus are, as stated, over 31 inches long, and this distance is the maximum that can be given to the space between the terminals as the apparatus is constructed.

The power of the discharge is exemplified by the ease with which glass plates are punctured. Heavy pine or even oak boards are perforated and set on fire. The discharges scorch a black line where they pass over a surface of wood, and soften glass where they locate themselves in passing over a sheet. A stick of wood placed between the terminals and joining them is splintered and torn by the discharge, and is found covered with a fur of fine splinters. Glass vessels are shattered in the line of the discharges, and inflammable matter is set on fire.

Perhaps the most beautiful effect is obtained by the insertion of a plate of glass between the electrodes when separated about 24 inches. If the glass be thick enough to resist perforation, the discharges spread all over it and pass around the edges, producing an almost indescribably beautiful effect, especially in a feebly lighted room which allows all the minor ramifications of spark to be seen.

The induction in the fine secondary of the apparatus is about 1,500 to 2,000 volts for each turn, which would give 750,000 to 1,000,000 volts total for the 500 turns. But, on account of condenser actions absorbing a part of the discharge, it is probable that the effective electromotive force between terminals may not much exceed 500,000. We have no ready means of measurement of such pressures.

A very simple and inexpensive form of apparatus for obtaining these high potential discharges is shown in Fig. 3.

It consists of a wooden trough, the joints of which are capable of holding oil, its parts may be nailed or screwed together in the ordinary way with shellac or white lead.

The primary coil of 10 turns lies against the sides of this trough, and the secondary layer may be an ordinary wire heavily insulated with cotton and wound on a cylinder of paper C or card board covered with dry muslin or silk. If the turns are not over six inches in diameter the cotton insulation between turns will suffice if rather thick, say, $\frac{1}{100}$ of an inch or over.

The secondary terminals are taken out at the center of the ends of the cylinder as shown and led up through a glass vessel G, which may be conveniently made of two bottles with the bottoms removed and cemented together, or a specially blown glass vessel may be used instead. Its object is to hold oil and cover the secondary terminals to a height sufficient to remove them far

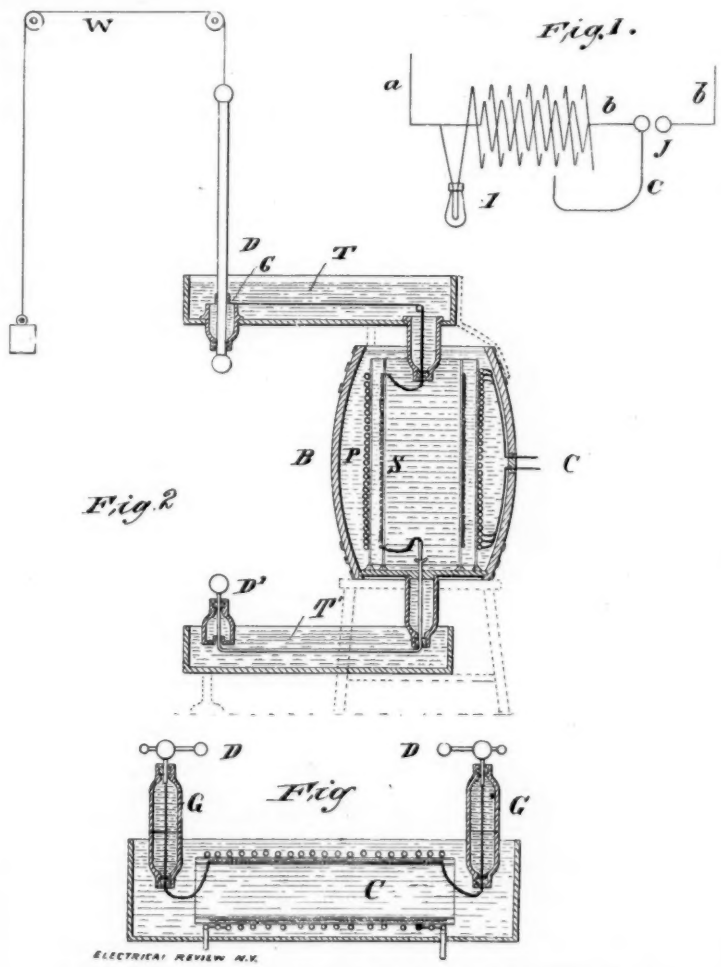


Fig. 1.

Fig. 2

Fig. 3

DYNAMIC INDUCTION AT HIGH POTENTIALS AND FREQUENCIES.

enough to prevent discharges passing over the surface of the oil in the trough, which is used to cover the coils, as indicated. The discharge terminals D D, pass up and outward from the bottles and the sparks are obtained between them. The simplicity of construction is evident, a trough four feet long will hold a coil capable of giving a spark discharge three feet long. By coupling up two such troughs in tension this effect may doubtless be doubled if required.

It is important, of course, that all connections, leads from the condenser to the primary coil, etc., be as short and as free from self-induction as possible, or the rate of oscillations on which the high inductions depend will be lessened and the effects be weakened to some extent. The potential given by a secondary coil of a certain number of turns depends, of course, on the rapidity of magnetic change and the extent of such change, or maximum densities of field attained. The greater the number of turns in the primary the greater will be the field strength, if the same current flows in every case. But increasing the number of primary turns slows the oscillation rate and diminishes the maximum current value, and so diminishes the magnetic density. There is evidently to be selected, therefore, for each condenser, that number of turns which will give the highest product of the rate of change and the extent of change or maximum field.

As a striking illustration of the slowing effect of numerous turns of wire on the periodicity or rate of change, it may be mentioned that if, instead of passing the condenser discharges through a coarse coil of few turns, using the spark gap and charging transformer as before, they be passed through a well insulated coil of many turns of comparatively fine wire, the discharge rate may easily be brought down low enough to cause the spark to whistle along with the sound of the alternating discharges of 125 periodicity used in the charging transformer. The introduction of a well made iron wire core greatly lowers the tone obtained. It is conceivable that an approximation to music might be obtained from spark discharges sent through coils of such varied inductance as to cause the rates of oscillation to follow those of the musical scale.

In the conduct of the experiments on high inductions, which have been described, one cannot fail to be impressed with the capabilities of oil as an insulator. The perforation of two inches of oil between rounded terminals of, say, one-half inch diameter, would seem to demand a potential capable of causing a leap of five feet in air. It appears to be true that edges or points under oil, or embedded in any insulating medium, are effective in inducing puncture, for the same reasons as they are effective in discharging through air. They act as electric wedges, and concentrate the dielectric strains upon those parts of the insulating medium directly in front of such points or edges. Hence, the most perfect insulation to resist puncture in oil or air demands smooth surfaces of as large diameter as possible. This is, of course, a different matter from insulation resistance or power of resisting leakage.

Greencastle, Ind.—Greencastle Gas and Electric Light Company; capital, $50,000. Promoters, James Green, Charles D. McClure, Lewis M. Ramsey, all of St. Louis, Mo.

Manitou, Colo.—The Fremont Electric Light and Power Company; capital, $50,000. Promoters, Edward P. Creighton, M. A. Leddy, Colorado Springs, Colo., and H. H. Brown, Denver, Colo.

Omro, Wis.—The Omro Electric Light and Power Company; capital, $5,000. Promoters, C. S. Douty, W. W. Race, H. C. Scott, M. Phillips, F. Dennis. Incorporation papers sent to Charles Felker, Oshkosh, Wis.

Duluth, Minn.—Tower Electric Light and Telephone Company; capital, $60,000. Promoters, G. H. Claypool, A. C. Batchelor, E. C. Jones, all of Duluth, Minn. Incorporation papers sent to E. C. Jones, Duluth, Minn.

Electric Heating.

Probably no part of the electric business is being watched more carefully to-day than that of electric heating. Owing to the push and enterprise of the selling agents, the Electric Merchandise Company, the Burton electric heaters have had an enormous sale during the past season. Electric street roads in all parts of the country, as well as Canada, have been equipped wholly or in part and almost universal praise is heard regarding the very great satisfaction found in their use. Notwithstanding some statements which, owing to ignorance, have been given, which statements tended to show that the heaters were more expensive than stoves, the owners state that it is a fact capable of demonstration that, taking everything into consideration, they are more economical than any other means of car heating. Even were this not so, the very great advantages of a properly heated car in all its parts, the pleasant nature of the heat, the little attention required, the absence of dirt, smoke and ashes, are points strongly in favor of electric heating. Managers of electric lighting stations are looking into the matter with a great deal of interest and the demand is growing for electric heaters for household use. Quite a large number of houses were fitted up during this season with the Burton electric heaters.

New York Electrical Society.

The one hundred and forty-third meeting of the New York Electrical Society was held in Professor Chandler's lecture room, Columbia College, on Friday evening, March 25, and was made particularly interesting to members and guests by the delivery of a lecture on "Electrical Measuring Instruments," by the president, Prof. F. B. Crocker.

The meeting was called to order promptly at 8 P. M., and, after the reading of the minutes of the previous meeting and the admission of several new applicants for membership, Professor Crocker took the floor. After a few preliminary remarks, he proceeded at once to the subject in hand, which he handled in a masterly manner, and kept his hearers' attention closely engaged for over two hours.

The professor had before him as fine a collection of instruments as is to be found anywhere in the country, and he proceeded to explain their purpose and the advantages and disadvantages of each in a concise and businesslike manner, clearly setting forth their relative values from the standpoint of practical electrical engineering requirements.

At the conclusion of his address it was moved and seconded that a vote of thanks be tendered to him by the Society for his efforts in their behalf, which was unanimously carried and accorded with hearty good will.

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It is very probable that a system of electric launches will be adopted by the World's Fair management to run on the lakes in the grounds of the Exposition at Chicago. This would be an attractive feature, and the electrically propelled boats, using storage batteries, would answer every requirement. In point of convenience, safety and cleanliness no other method of providing power for this purpose equals the electric.

Experiments have recently been made with the electric lighting of several first and second class carriages on the Werra Railway, running between Meiningen and Lichtenfels, and, should they be successful, it will probably be adopted as the means of illumination of the carriages of the company. The light is obtained by means of accumulators of the Correns type, each charge providing sufficient current to light the carriages, which are each fitted with one 12 candle-power lamp and four 8 candle-power lamps during a return journey between the two places mentioned, the accumulator charging station being at Meiningen.

In another place in this issue we reprint an editorial from the Cincinnati *Volksblatt* on municipal ownership of electric plants. As a piece of fine writing this article is splendid, and as a logical exposition of the fallacies of municipal ownership it is interesting and valuable.

We have it on excellent authority that Spring has come and come to stay. Now we may expect to see electric railway construction take such a boom as it has never before enjoyed. The number of electric railway companies incorporated during the past Winter has been unusually large, and the practical work of construction must soon begin.

The most recent application of electricity is as a prod to race horses. A jockey last week at the Guttenburg track was found to have a series of galvanic cells mounted in a belt about his waist and connecting with his spurs. Doubtless there was an intermediate induction coil. He was ruled out by the judges. How effective the device is does not appear, as that particular horse lost the race. Such a method of punishment would doubtless be more effective than the lash or spur and it is quite as humane. We have heard of a similar treatment to prevent horses from taking the bit.

THE SITUATION.

The electrical industry, like many another child, has at times grown beyond its strength. It has always recovered itself quickly, however, and any instability which may have been apparent has been but temporary. The business in general is now in the throes of a mild revolution and people are looking to see where and upon what they stand. Yet withal every one is cheerful and this is characteristic. There are combinations in progress and may be more to come. This we may regard as the prime cause of the present restless feeling, although not the only one. Business is good and collections are fair to middling. In this way matters are slightly compensated. A general purpose on the part of the large companies to reduce expenses, improve products and clear out the "fakirs" seems evident; good results will surely accrue from such a movement. One of the chief dangers which manufacturing companies in the electrical business must guard against is over-capitalization. The evils of this system are sure and sometimes sudden.

FLYING.

Mr. Loeber's contribution to the science of aeronautics, printed on another page, is a phantasmagorical curiosity. Given "anthexis" says the writer and flying becomes simply a "matter of technical routine." "Give me a lever long enough," said the old philosopher, "and a fulcrum, and I will lift the world." All our venerable sage of antiquity required was a lever and fulcrum; his modern apostle, however, must have *anthexis.* Anthexis seems to be a pseudonym for a hurricane, as its distinguishing characteristic is a tendency of air to rush into vacuous space at a pace of 1,300 miles an hour and push everything before it to the tune of 2,116 pounds per square foot. A reflective mind might confuse this newly christened force with air pressure, which, being 15 pounds to the square inch or 2,160 pounds per square foot at sea levels, would make its first cousin anthexis hustle for its laurels. The method of maintaining the hurricane is a trifling consideration ignored by Mr. Loeber—as "forming no necessary part of the physics of his system." The cool indifference of this postulate reminds us of the palmy days of the primary battery, when the chemical ingredients were to cost only a few cents per day and earn dividends from their bye products. It seems that anthexis can be boxed up and carted around at will to exert its giant strength wherever desired. It has not yet occurred to the inventor that he might utilize it for driving locomotives and all other sorts of engines and, by saving fuel, reap a rich reward. It would be well, therefore, to harness anthexis to a road cart before risking precious necks in air cars.

ARTIFICIAL LIGHTNING.

It is the privilege of the REVIEW this week to present some further experiments of Professor Thomson on artificial lightning. The apparatus illustrated has yielded sparks over an air gap of 31 inches. As a result of electro-dynamic currents this is sufficiently interesting, but the point of greatest importance is the evidence borne of the efficiency of oil insulation. A paraffine oil was used and the enormous voltages, probably a quarter to half a million of volts, were easily maintained. With pointed electrodes the oil insulation can be broken down, but with a spread of opposing surface it becomes vastly more resistant. The effect of a coil upon the period of the transmitted vibrations is highly interesting. The rapid waves may be damped out by using sufficient wire and only the long waves will be transmitted. This, of course, might be expected from our experience with the effects of self-induction in telegraphy and telephony. It is of great interest in connection with the light-without-heat search. It is generally believed possible such a light might be attained if provision could be made for developing currents of sufficiently short wave length. The time period of such waves must be measured in billionths of a second. The reflection is pertinent, Could such waves ever get over a conductor?—millions of volts would be insufficient to force them through even a few feet of heavy copper wire. The effects of the long discharges seem identical with those of lightning. Thirty-one inches of dry laboratory air is equal to a much greater length of moist air. It would be interesting to ascertain how far the spark could be lengthened by spraying the gap with moisture or a moist air blast.

The simplest case of transmission of power is where the mechanical output of a stationary motor has to be transferred to far-distant working machinery. Such a problem presents itself when, for instance, at a great distance from a city, a cheap water power is available, and it is contemplated to use it to drive any kind of machinery in the city. The electric current enables us, therefore, in such a case to take advantage between the difference in cost of mechanical power in the city and in the distant locality where the water power is situated. This difference in cost is based on the relative position of the producer and of the consumer of power. A second case of power transmission presents itself when it is desirable to distribute the power of one stationary motor to one or more other motors which have to be moved about. This is especially the case with electric railways. The economical advantage of electric railways is based on the fact that it is much cheaper to generate power on a large scale than to do it in detail by working small wasteful locomotives, which may be superseded by one centrally located and economical engine. A third important application of the principle is the distribution of power in factories, cities and industrial towns. It is evident, also, that cases may present themselves in which a neighboring water power may in this way distribute the power during working hours or daylight, while at night it can be used for public and private illumination.

We print in another place a communication from a correspondent in which complaint is made of the manner in which the daily newspapers assume electricity to be the cause of fires that cannot otherwise be satisfactorily accounted for. We have often written about this matter, and have finally reached the conclusion that the reporter uses this excuse because it is so well adapted as an explanation of a mysterious fire. It looked for a time as if the reporter lacked electrical education, but this theory does not hold good in the face of the great quantity of electrical literature now published. With numerous statistics showing that fewer fires are caused by electricity than in any other known manner, a reporter who attributes a fire to this agent when the facts do not warrant the assertion must do so from choice. Who will bring the first libel suit on this ground against a daily newspaper?

CORRESPONDENCE.

OUR CHICAGO LETTER.

The Rockford Electrical Manufacturing Company, Rockford, Ill., have just installed a 500 light machine for Messrs. Barnhard Bros. & Spindler, large type manufacturers of this city.

The St. Louis Electric Supply Company, St. Louis, Mo., has leased an adjoining room, largely increasing its store and office facilities, and will soon have one of the most complete stocks of supplies carried by any house in St. Louis.

The Pfister Hotel, at Milwaukee, is to have one of the largest and finest incandescent plants in the West, the specifications calling for nearly 3,000 incandescent lamps. This will mean a large batch of Simplex wire to be furnished by George Cutter.

The Chicago Edison Company has been given a contract to furnish two 540 light Edison dynamos for the new Tobin apartment house at Thirty-third street and Cottage Grove avenue. This is a beautiful structure and when completed will be the finest apartment house in this city.

An Isolated Incandescent lighting plant is to be installed in Chapin & Gore's restaurant on Monroe street by the Chicago Edison Company. The establishment will be lighted by 360 sixteen candle-power lamps, supplied from a dynamo in the basement driven by the Buckeye engine now in service.

At a Meeting of the Chicago Electrical Association on Tuesday, March 22, at the Society's rooms, the subject, "Electric Block Signal System" was presented by Mr. Bassett, followed by a discussion by Mr. Hickok. Following this a paper was presented, subject: "Electrical Literature," by Mr. Hooey, followed by a discussion by Mr. Dimick.

The Great Western Electric Supply Company is pushing the sale of the Bernstein series incandescent lamp, for which it is the general Western agent. It is claimed for their lamp that the "combination socket" has been so perfected that it acts perfectly automatic, so that should an accident happen to the lamp the circuit will remain intact.

Denton, Texas.—W. J. Williams, Dallas, Texas, has been granted a franchise for water supply and electric lighting at Denton, Texas, and has organized the Denton Water Works and Electric Light Company. He has contracted with the Dallas office of the Pond Engineering Company for two 70 horse-power steel boilers, which will be erected at once.

Personal.—S. A. Barton, president of the Brush Electric Company, was in the city last week. J. W. Johnson, manager of the isolated lighting department of the Thomson-Houston Company in this city, is confined to the house by illness. R. A. Hewitt, secretary and treasurer of the American Electric Elevator Company, of New York, took dinner at the Chicago Electric Club, Saturday last, as the guest of George P. Nichols.

M. G. Nixon, a representative of R. J. Douglass & Company, has brought to the World's Fair grounds a pleasure boat closely resembling the familiar steam launch. It is run by an electric storage battery. The vessel is 30 feet long with a six foot width of beam, and will easily accommodate 20 people. The ice on the lagoon fronting the Transportation Building was broken and a trial trip made, ten persons being on board, with very satisfactory results.

The Emerson Electric Company, St. Louis, Mo., on account of a large increase in business, have been compelled to secure more spacious quarters. They have leased an entire building 60 by 100 feet, three stories high, on St. Charles street, which they are rapidly fitting up, in order to be better prepared to supply the demand for their well-known goods. Judge Emerson, president of this company, has sold out his interest to H. L. Parker, and retired from active business life. Mr. Parker has been elected president to succeed him, and will manage the company's affairs in the future.

The Electric Merchandise Company, Chicago, thinks it is getting a good big share of the business doing now and we believe it is right. The continual sound of the hammer in the shipping rooms tells the tale. The popularity of this house is proverbial and it well deserves the reputation it has. Better words than ever are being said of its material this season. Its standard devices are being made heavier and stronger than heretofore, while they retain the same high degree of insulation. The company has secured several contracts for complete equipment already this Spring and many unusually large orders for its line fixtures.

The Meeting of the Chicago Electric Club, held Monday evening, March 21, was very enjoyable. The entertainment took the form of a debate, in which Elmer A. Sperry advocated the use of "One Motor for Car Equipment," while Mr. W. L. R. Emmet championed "Two Motors for Car Equipment." A general discussion followed, in which Messrs. Arnold, Sullivan, Grier, Sperry and Perry participated. After the literary meeting the club voted that the chair appoint a committee of two to frame appropriate resolutions on the death of C. J. Van Depoele, and Messrs. Arnold and Sperry were named to act in this matter.

The Columbia Incandescent Lamp Company, St. Louis, Mo., has, during the last year, rapidly grown in popular favor, so much so that the second enlargement of its factory is now necessary. During the last four months the factory has been run night and day and still they are unable to make lamps enough to fill orders promptly. Since March 1 two orders of 10,000 lamps each have been received, and between March 1 and 15 the sales have been in excess of 30,000, which speaks volumes for the popularity of this lamp. Aside from the commercial lamp, a special lamp for street railway and motor cars is being made. A special feature of this lamp is that the filament is anchored at the bottom to prevent vibration and early discoloration. The lamp is being used on several electric railway lines in St. Louis and is giving the very best satisfaction.

Chicago, March 26. M. J. B.

OUR SAN FRANCISCO LETTER.

The Telephone Building on Bush street is nearly ready for occupancy.

The Cars to be used on the Stockton electric road are to be built at the Stockton car works.

The Folsom Street Electric Road has applied to the Harbor Commissioners for a franchise to lay a track down East street to the ferries.

The Edison General Electric Company are making preparations to move into more commodious and conveniently arranged quarters on Pine street.

The Contract for supplying electric lights in the marine barracks at the Mare Island Navy Yard has been awarded to the California Electrical Works.

The Macdonough Theatre, now in course of construction in Oakland, is to contain 2,080 incandescent lights. It will be one of the largest theatres west of Chicago.

The Branch Road of the Oakland Consolidated Railway Company to Mountain View Cemetery is now in operation. This new electric road starts from the main line at Fortieth and Grove streets.

A. Weihe, superintendent of the American District Telegraph Company, of this city, was recently shot at four times by a discharged messenger boy who claimed there was money coming to him. Mr. Weihe miraculously escaped serious injury.

It is Stated that an electric road is to run to Bear Valley from Redlands. Bear Valley, which is in the mountains at an altitude of 6,000 feet, produces large quantities of ice, and it is the intention of the promoters of the road to transport this into Redlands, from which place the whole southern country will be supplied.

The Thomson-Houston Electic Company have closed the contract for the equipping of the Oakland, Haywards and San Leandro Electric Road, the contract price being $46,130. This includes the furnishing of seven cars, together with all electrical apparatus necessary for the complete equipment of the road, which is 13 miles in length.

The Plant of the Berkeley Electric Light Company was recently attached by the Edison General Electric Company, of this city, in a suit for $550 against the manager, A. A. Osborne. The Board of Trustees of Berkeley refused to pay Mr. Osborne his wages or bills incurred for supplies until better lighting service was assured, and for this reason he was temporarily embarrassed.

A Daily Morning Paper in this city in criticising the Board of Supervisors for granting the Metropolitan Railway Company the privilege of using the overhead system on the Eddy street line, broaches some information relative to the danger incident to the use of the system, which, to say the least, is quite novel, and must have been written by some one endowed with a vivid imagination. It proceeds as follows: "The board must know the dangers attendant upon running a highly charged naked wire over a crowded street, where, if the wire breaks and falls, it is sure to do great damage and very likely cause death."

The Edison Light and Power Company have in contemplation the extension of its works in this city. The new central station, which is to be a brick structure, will be erected on Jesse street at a cost of upwards of $500,000. Five branch stations are to be located in different parts of the city. The new Edison multipolar dynamos will afford a capacity of 48,000 incandescent lights. Power for driving these will be furnished by six combination triple-expansion vertical engines. All wires are to be placed underground. The Jesse street plant, which is to have a chimney 128 feet high and 28 feet square at the ground, will be one of the largest in the world.

It Was Stated that the recent fire in the Phelan building, which caused about $8,000 damage, originated from a piece of electric light carbon falling among some inflammable material. The daily papers, as usual, had headings similar to the following: "Caused by Electricity," etc. Upon investigation it was found to have been caused by cigarette smoking in the basement. There seems to be a tendency to lay the blame of all fires from unknown causes to electric wires, whereas, upon investigation, some other cause is found. The reports of the fire underwriters for the past year show that the fire loss occasioned by electric wires in San Francisco has been nominal.

The Chinese who are domiciled in San Francisco's extensive Chinatown, have learned to make use of the electric current in order to keep their many gambling dens from being apprehended by the police. In order to secure a conviction it is necessary that every piece of paraphernalia used in their many gambling devices be brought into court. The wily Chinese are cognizant of this fact, and in consequence have introduced many electrical contrivances by which warning may be given and their apparatus made away with before the police enter their apartments. In some cases sentinels are placed at the doors, and at the approach of an officer a button is pressed. In other cases alarms are placed on the doors and concealed electric floor mats used. At one time a complete telephone system was discovered in the Chinese quarter, most of the instruments having been made by an ingenious Chinaman. J. R. K.

San Francisco, March 25.

OUR BOSTON LETTER.

The Walworth Manufacturing Company, this city, has filled orders for upward of 1,000 of its iron electric railway poles during the month of March.

New England Telephone and Telegraph Company has declared a dividend of 75 cents per share, payable May 14 to stockholders of record March 31. The transfer books will be closed from April 1 to May 2, both days included.

Mr. Charles H. Burleigh, assistant manager of the Thomson-Houston Electric Company's isolated electric lighting department, has been notified that he has been promoted to active membership American Institute of Electrical Engineers.

Messrs. C. H. MacKenney & Company, this city, the old established designers and manufacturers of gas and electric fixtures are introducing many new novelties in their line. Among these novelties are fancy electric fixtures representing winged insects and bugs.

Waterville, Me.—Recent advices from this enterprising town state that the equipment for changing the horse railroad into an electric road has been purchased, and the work of placing poles will be begun early in the Spring. The largest generator ever brought into Maine will furnish the necessary power.

Peabody, Mass. — Advices from town named, under date of March 25, state: "At the town meeting yesterday afternoon it was voted to raise $40,000 for an electric light plant by issuing 30-year four per cent. bonds. The committee reported it advisable to put in the incandescent system of commercial lighting."

Mr. F. A. Magee, of this city, has been appointed New England agent for the Bishop Gutta Percha Works, of New York, and will carry in stock a full line of the excellent wires and cables manufactured by the Bishop people. Mr. Magee is agent also for the Cleveland arc cut-outs and transformer cut-outs, and for the belting and belting specialties of the Underwood Manufacturing Company.

Electric Cars at Avon, Mass.—Information has just been received from the town named as follows: "The electric cars began running here to-day. The trial trip was made yesterday, and this morning three cars were put on, which have been running between Campello and Avon all day. The lack of equipped cars makes it necessary to run a number with horses, but this will be remedied in a few days."

The Walworth Manufacturing Company, this city, has had its hands full during the past fortnight to keep pace with orders received for the "Walworth" electric railway pole. Among the orders recently filled were as follows: 910 poles to the Lowell and Suburban Railway, Lowell, Mass.; two car loads of poles to the Citizens' Street Railway, Indianapolis, Ind.; three car loads of poles to the Rock Creek Railway, at Washington, D. C.; and 96 poles to the Dubuque Street Railway, Dubuque, Iowa.

Mammoth Isolated Electric Plant.—The isolated electric lighting department of the Thomson-Houston Electric Company has been awarded the contract for immediate installation of a plant at East Cambridge, Mass., with a capacity of 1,000 incandescent lights to furnish electric illumination for the Middlesex County House of Correction and the County Court House. The plant will include storage batteries for night lighting. Work is already in progress and will be pushed rapidly. It is predicted that this will be, when completed, one of the most complete electric light installations made in any public institution. W. I. B.

Boston, March 26.

Underwriters' Association of the Middle Department.

SECRETARY'S OFFICE,
No. 316 Walnut Street,
PHILADELPHIA, March 21, 1892.

TO THE EDITOR OF ELECTRICAL REVIEW:

Seeing an editorial in your issue of the 19th inst., in which you state that "the Underwriters' Association of the Middle Department of Pennsylvania recently issued a circular arguing the great danger of fire from electric lighting and increasing their premium 25 per cent. on electric light risks," I wish to make a few comments on same.

The association readily recognizes the safety of electric lighting over other forms of illumination when properly installed, and in evidence of same has given a reduction of rate for special hazards.

The extra premium mentioned does not apply to risks that are wired in accordance with rules, only to those that are found defective.

You advise the association to "lay down the proper requirements, and pass no installation that does not meet them." This is exactly what is being done and, furthermore, the rules you mention, those of the National Electric Light Association, are the very ones which are being carried out. By giving this a space in your valuable columns you will greatly oblige, ALFRED E. BRADDELL,
Inspector.

Electricity and Fires.

TO THE EDITOR OF ELECTRICAL REVIEW:

There seems to be a growing tendency among insurance companies, or the parties in whose premises disastrous fires have occurred, or the public at large, or possibly our daily newspapers, to make sweeping and, as it were, conclusive assertions, that the damage from fires directly results from electric light wires.

Apropos of this we enclose a clipping from the St. Louis *Republic* relative to a large fire that occurred here yesterday. As stated in the second clipping from the St. Louis *Post-Dispatch*, we did the wiring in this building and happen to know that there were no wires within 40 feet of the place where the fire started.

It is immaterial to us who makes these broadcast statements, they are nevertheless very damaging to our line of business, and, to say the least, very unjust. Can't you take this matter up and publish in the columns of your valuable sheet a few lines to serve, as it were, as an antidote for this virulent poison which has been thrown into the public mind? Very truly,

ST. LOUIS ELECTRICAL SUPPLY CO.

St. Louis, March 19, 1892.

The following paragraph from a recent issue of the St. Louis *Republic* is the one alluded to in the above communication:

The theory of the officials of the Liggitt & Myers Company is that the heat of the room burned the insulation off the electric wires and by the wires thus exposed the abundant inflammable material in the room was ignited.

PERSONAL.

Mr. Henry Alexander, the treasurer of Alexander, Barney & Chapin, New York, has tendered his resignation and will sever his connection with the company April 1.

Thomas A. Edison is looking after the mining property near Valley, N. J. He has the refusal of the Turkey Hill mines and, if he purchases, will establish an electric ore separator plant.

Mr. E. P. Roberts, superintendent of the Swan Lamp Company, Cleveland, Ohio, was a New York visitor during the past week, and the REVIEW is indebted to Mr. Roberts for a very pleasant call.

The Central Electric Company, of Chicago, closed its doors last Saturday on account of the death of Marion McKinlock, infant daughter of George A. McKinlock, treasurer of the company.

His many friends were glad to welcome back to New York Mr. C. E. Stump, of the *Street Railway Journal*, who last week returned from Florida, where he had gone to recover from a severe attack of illness. Mr. Stump found health, if a good coat of sunburn counts for anything.

Telephonic News

*** Auburn, N. H., is to have a telephone exchange.

*** Cooper, Mich., will have a telephone exchange with one telephone.

*** The Atlanta, Ga., telephone exchange has about completed a new magneto line switchboard to be used exclusively for the long lines and "trunk" lines entering that office.

*** Preparatory to holding the annual meeting, the transfer books of the Mexican Telephone Company were closed at the close of business March 25, and will remain closed until April 21.

*** The directors of the Bell Telephone Company have decided to recommend to stockholders, in connection with the issue of $2,500,000 more of new stock, the giving of one share of new for each six now outstanding. The additional issue will give the company a total capital of $17,500,000 and leave it with the right to put out $2,500,000 more.

*** The Pennsylvania Railroad Company have placed long distance telephones in the office of the vice-president, general manager, general superintendent and division superintendents of the main line, to enable them to have personal and instantaneous communication with each other when occasion or necessity requires. This is a great and valuable auxiliary to facilitate business matters.

Northwest Thomson-Houston Company.

The Boston Stock Exchange has admitted to the list the Northwest Thomson-Houston Electric Company, non assessable, organized under the law of Minnesota to deal in all kinds of electrical apparatus. Authorized capital stock, common, $750,000; preferred, $750,000; total, $1,500,000, full paid; par value, $100; capital issued, common, $750,000; preferred, $503,600; total, $1,253,600; H. M. Byllesby, president; Howard C. Lewis, vice-president and treasurer; B. F. Meek, Jr., secretary and assistant treasurer; George C. Duffie, assistant secretary; directors, H. M. Byllesby, Howard C. Lewis, M. Auerbach, V. M. Watkins, E. I. Garfield, all of Boston; B. E. Surrey, Chicago. Principal office, St. Paul, Minn. Transfer agent, Old Colony Trust Company, Boston.

Telegraphy by Telephone.

It was noonday in a busy down-town office, and a *Herald* reporter was awaiting the return of the manager, when the pretty stenographer went to the telephone, and, after the usual parley with Central, called:

"Hello, Charly. Are you busy just now?"

Apparently Charly was not, for she continued: "Oh, yes, I had a lovely time, but don't you think——"

Here there came a strange pause, and with a pencil she tapped idly on a light piece of board which she had taken from her desk and was holding before the transmitter.

"A case of 'wait a minute,'" thought the eavesdropper, sympathetically; but the pretty girl spoke again, with a laugh:

"I don't believe it, for I heard——"

Then she began tapping on the board again. Then the reporter caught on. She was telegraphing. So when she returned to her desk, he remarked: "I notice you have an original method of telephoning."

"Oh, did you see that? Well, I'll tell you about it, but you must not give it away. You see I can't use the telephone here without every one in the room hearing what I say, and they do say that those girls in the central office listen to the conversations over the wire, and, as Charly and I are both telegraphers, we invented this method of conversing by telephone. Isn't it a great scheme? Not one in the office understands it."

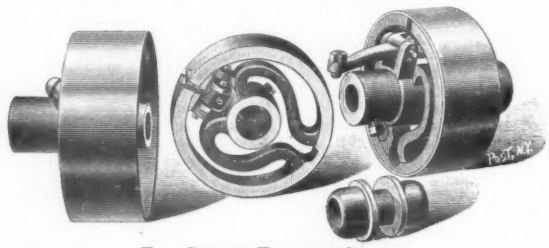
But a young man at an adjacent desk worked a sounder in pantomime and winked at the *Herald* man.—*Boston Herald.*

An Improved Friction Clutch.

The accompanying illustration represents the new improved friction clutch of the Garvin Machine Company, of New York, which they have designed especially to meet the requirements of their screw machine and turret lathe work. By reference to the cut it will be seen that the friction proper consists of a spring ring which is caused to expand by the drawing in of a taper bolt, this bolt being operated by the usual finger and sliding cone. It will be seen that the friction ring has no direct connection with the hub, being connected thereto by two curved arms, which extend as far as possible to the opposite of hub. The feature in question greatly increases the elasticity of the ring, and allows it to fill in all directions, giving a perfect bearing. Double provision is made for taking up all the wear by means of the usual adjusting screw with set nut on outer end of finger, and also by screwing the taper bolt into the nut, which is pivoted to inner end of finger. This allows of a readjustment, should the clutch wear sufficiently to use the full length of outer screw, by simply screwing down the taper bolt and returning outer screw to its original position.

The pulleys are made with long and ample bearings, the inner hub extending inside the friction beyond the face of the pulley, and is provided with an efficient self-oiling device.

These clutches have withstood the most severe usage, and have proved especially serviceable under high speeds and heavy loads, giving a quick and positive reversal with a smooth and easy motion, which latter feature is most important in countershafts,



THE GARVIN FRICTION CLUTCH.

which are constantly reverse. These friction clutches are made in three sizes, and will accompany all of the Garvin Company's standard machines having friction counters.

The Burial of the Wires.

Chatting the other day with Jacob Hess, one of the Subway Commissioners for this city, he said: "I wonder if the people of this town are aware of the fact that, despite all that has been said against the dilatoriness of the Subway Commission, there is not a telegraph pole nor an electric light wire on Broadway, between the Battery and Central Park." As a matter of fact, I presume that very few people in town realize what has been done in the way of burying the dangerous wires. The process has been so slow that the impression upon the public mind has not been vivid. When we stop to think of the prodigious character of the contract to rid this city of its network of menacing and hideously ugly overhead wires, it is a surprise that so much has already been accomplished in that direction.

The hostility of the Western Union and the telephone and electric light companies to the subway system delayed work for at least two years, and even now these corporations are embarrassing the Subway Commissioners. It is surprising to observe the improvement made in a street when the poles and wires are removed. Lexington avenue, in which street I live, has been wondrously improved by the change. The tall poles, which seemed anxious to meet and shake hands from both sides of the street, narrowed the perspective very much. Now that they are gone, the street looks at least 20 feet wider and there is an opportunity to see something of the architecture. There never was a greater advance toward making New York the beautiful metropolis which it is destined to be than that which marks the beginning of the burial of the overhead wires.—*John A. Cockerill in N. Y. Recorder.*

Hearing on the Telephone Bills.

The Assembly Committee on Gas, Electricity and Water, of the New York legislature, gave a hearing March 23 on the bill of the Telephone Subscribers' League of the city of New York, to reduce the rental of telephones and the tolls. There are two bills—one introduced by Mr. Rice, of Ulster, and one by Mr. Cahill, of Kings—both designed to accomplish the above reform, and another bill, the old Blumenthal measure of last year, which provides for the appointment of a commission to fix rates, and which was introduced by Mr. Malone, of Brooklyn. A large delegation appeared and argued in favor of the measure.

Assemblyman Malone asked that the committee take action at once. Chairman Martin asked if he did not think that the opposition to the bill should be heard, and Mr. Malone said he did not. The bill did not reduce rates, but appointed a commission. The committee will report the bill for a place on the calendar and have it recommitted for a hearing this week, when the telephone companies will present their arguments against it.

An Edison Dinner.

In connection with the opening of the new district store of the Edison General Electric Company in Springfield, Mass., a complimentary dinner was given, on Thursday evening, March 17, to the members of the press and central station representatives of Western Massachusetts and Eastern Connecticut. Early in the evening a large number of invited guests assembled in the new store, 219 Main street, and there, after having been shown the fittings, fixtures, stock and other accessories, and having had an opportunity to witness the operation of the motors and dynamos which were on exhibition, the party adjourned to the private dining room in the Cooley House, where they sat down to a spread, which proved one of the most enjoyable occasions in the history of the electrical fraternity in that vicinity. The tables were beautifully decorated with flowers, among the more elaborate pieces being one in the center composed of a very large dish of flowers arranged in pyramidal form and surmounted by groups of small incandescent lamps, inclosed in varicolored shades. At either end of the table were low banks of daffodils, behind the petals of which were burning groups of miniature red incandescent lamps. The lighting of the table in this manner was exceedingly agreeable, and rather out of the usual order of decoration. After having thoroughly discussed the choice *menu*, Mr. Kimball, manager of the supply department of the New England district, introduced various gentlemen, who spoke at more or less length on subjects interesting to all those present. Among the toasts answered were one to the "Edison General Electric Company," by Mr. Knight, district auditor; "The Springfield Store," by Mr. Todd; "Our Guests," by Mr. Countiss; "The Press," by Mr. Smith; "The Electrical Industries of Western Massachusetts," by Mr. Anderson, and "The Ladies," by Mr. C. C. Pierce, representing the railway department of the New England district, who was followed by Mr. S. A. Douglas, representing the central station department, in a number of well chosen and heartily applauded stories. During the evening letters of regret at not being able to attend were read from Mr. Sidney B. Paine, district manager of the New England district, and various other gentlemen. Choice instrumental and vocal selections were given during the course of the evening, and at a late hour the guests departed, after having expressed themselves unanimously in thanking their generous host for the delightful entertainment afforded, and wishing the Springfield store all possible future success.

The Postal Telegraph Question.

There was talk some time ago to the effect that the ill-feeling supposed to have existed between Mr. Gould and Postmaster General Wanamaker had given place to more friendly relations, and that the result of a better understanding between them would appear during the session of Congress in a new sort of postal telegraph bill. Heretofore the postal telegraph bills have contemplated either the leasing of existing lines or the building of new lines to be operated in competition with existing telegraph systems.

There was introduced in Congress recently a bill, understood to have the approval of the Postmaster-General, which possibly represents an agreement between the Post Office Department and Western Union, and at the same time looks as though it might yield practical results. It proposes that the Post Office Department shall contract with existing telegraph companies for the transmission of messages, which are to be collected and delivered by the letter carriers of the Post Office Department.

The adoption of this plan would bring 500 cities having free delivery into direct electrical communication. The telegraph companies, it is claimed, can afford to transmit these messages at a low rate, because they have none of the expenses of collection or delivery. Practically, a person dropping a letter in a postal telegraph envelope in a box at Chicago would have it taken up at the next collection, telegraphed to its destination and there delivered in the next carriers' delivery.—*Boston News Bureau.*

LITERARY.

We have received the "Annual Report of the Connecticut Agricultural Experiment Station" for 1891.

The popular comedian, W. H. Crane, ("The Senator"), has written for the April number of the *North American Review* an article on the Star System, under the head of "The Modern Cart of Thespis."

We have received Vol. VIII of the "Transactions of the American Institute of Electrical Engineers" for the year 1891. The various parts composing the volume have been issued monthly during the year. It is a book of exceptional value which will increase as time passes.

"Central Station Lighting" is a handsome book issued by the Edison General Electric Company from the press of Bartlett & Company, New York. The work contains short descriptive articles on the advantages of the Edison system, illustrated with numerous handsome half-tones of Edison stations and apparatus. The authors and compilers of the work are Geo. W. Walker and Robert T. Lozier, of the Edison Company.

With the April number, the *Cosmopolitan* completes its twelfth volume in a manner worthy the wide and growing popularity of this magazine. The *Cosmopolitan* is the most superbly illustrated of the monthlies and the pictorial embellishment of the April number is rather above the average. The leading article is on "Genoa—the home of Columbus," written by Murat Halstead, who recently visited the city, and illustrated from photographs of all the principal relics of the great navigator which remain in Genoa.

Scribner's Magazine for April marks the beginning of two important series. The central subject of all social questions, and one of the most widely discussed of the time, is the conditions of life among the "Poor in Great Cities." It has passed from the stage of discussion into one of practical experiment, directed by men and women of great experience and scientific knowledge. The conductors of the *Magazine* have determined to embody the most significant of these results in a series of papers in which authors and artists will co-operate to produce a truthful representation of the things achieved. The second series which is begun in this issue is entitled "Historic Moments," the aim of which is to give brief pen pictures of important events in politics, history and invention, by eye-witnesses and participants in them, thus preserving in brief compass what it is hoped may be valuable historical material, as well as very interesting reading.

Municipal Ownership of Electric Plants.

If we recur to the above subject, it is done with a view to save the city from an impending danger, as far as it is in our power to avert it. The danger is great, because municipal ownership has, at first view, much to commend it to the uninitiated. When the people see public corporations pay out quarterly dividends, the thought suggests itself that the public exchequer might just as well obtain the profits instead of feeding voracious corporations.

But if the saying of the old Roman, "If two do the same thing, it is not the same thing," is anywhere applicable, it is of particular force in this instance. Private service and public service are as different from each other as day and night, and it should not be difficult to grasp the distinction. A private corporation is compelled to husband its resources or it will prove a failure. It will, therefore, not invest more capital nor employ more people than absolutely necessary, and will get full value for each dollar it pays out in wages. It is quite different with a public corporation. The citizens furnish capital in the shape of taxes, and if this is wasted they are simply bled for more money. In place of an expert, the management is confided to a politician, whose ignorance alone entails serious loss and damage. His employés are of the same stripe, gutter politicians, ignorant and careless, as they are appointed more with a view to their political influence than their ability; and to crown the misery we have a change of the *personnel* every few years. If these incompetent people have really acquired some skill and learning, a political revolution sets in. The dominant party is hurled from power, and a new party is enthroned. Its very first effort is to dismiss all employés and to make room for the heelers of its own party. Every reader will at once recognize that we merely state facts which have been experienced in our own city. No manufacturer in Cincinnati would run his factory on this plan, even if he received the working capital for a present, for he could not fail to foresee bankruptcy. Whenever public service has been introduced in the cities of America it has been everywhere the source of serious complaint. Take, for instance, our own water works. They are now, for the first time since their existence, fairly well managed, yet they are far from being satisfactory. Water rents are so high that a full supply of water for all domestic purposes may be ranked as a luxury. The poor quality of the water is notorious. On most days of the year it is unfit to drink. Very frequently the supply gives out, so that the citizens pay for a service which is not rendered to them. A private corporation could not dare to presume one-half so much on the patience and forbearance of the public.

And this, be it remembered, is a good administration; a reform administration, which, thanks to the efforts of Dr. Graydon, economizes to the best of its ability. But Dr. Graydon is powerless against a vicious system. We must take into account elements which are utterly foreign to a private service. But what a bad management means—of this we had a full taste several years ago. The citizens were horrified to find that the more money they dumped into the water works the less water was forthcoming.

Philadelphia has been extolled as a glorious example of good management for its good gas service. But what are the facts? The price of gas there is much higher than elsewhere in the United States. The management was so notorious for its corruption that it was replaced by a new Board, and this Board could save the city from loss only by obtaining a supply of gas from a private corporation. The city loses money on its plant, and is saved only from loss by the profit from the gas furnished by a private corporation, which only confirms the well known fact that public service is more expensive and unsatisfactory than private service.

It may now be contended that if honest officers were appointed the city might still realize a great profit from public service. The "if" is where the rule lies. Honest officers are the exception and not the rule. Several years ago a reform movement was set afoot in Brooklyn, the citizens fearing to be swallowed up in the gulf of corruption. A model man, a Mr. Seth Low, was elected Mayor. This glory lasted just two years. The Brooklyn administration now rivals Tammany in iniquity. Since we cannot rely on our authorities, it stands to reason that we should avail ourselves of their services as little as possible.

But, if we condemn public service, and the people complain against private service, it is necessary to find an escape out of the dilemma. We find it in the following views of Stuart Mill, one of the deepest thinkers in the realm of public science:

"There is a radical distinction between controlling the business of Government and actually doing it. The same person or body may be able to control everything, but can not possibly do everything, and, in many cases, its control over everything will be more perfect the less it personally attempts to do."

Public control is the great remedy. Private service, but strict control by the authorities, to secure cheapness and efficient work to the citizens. It is certainly easier work for the representatives of the people to conclude a contract securing the rights of the citizens in regard to electric lighting than to run an electric plant themselves. Can the Board of Legislation watch every laborer in an electric plant, and justify itself of a cheap management in every particular? Clearly not. But it is certainly capable of drawing up a contract securing to the citizens electric light of satisfactory quality and at reasonable prices.

If any one attempted to build a house and should himself employ all the masons and bricklayers, carpenters, joiners, etc., and should himself find the bricks, lime and

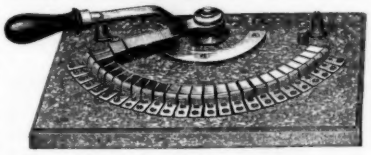


FIG. 1.—EDISON STAGE REGULATOR.

mortar, he would be sure to be set down for a fool; and it is just such an idiotic system which the advocates of public service recommend.

The whole idea of the public service is of socialistic origin; it is the genuine offspring of socialism. Socialists would hail a public electric plant as a vindication of their theory, and as a harbinger of future steps in the same direction. Public service for street travel, for the sale of liquor (actually advocated by the People's party), public bakeries, and what not, would be the logical outcome of such a system. Are the citizens of Cincinnati really prepared to invite socialism? Demagogues, too, take great delight in advocating public service. It is so easy to promise to fill the pockets of the people with money that aspirants for offices have ever preached the public service as the best means to catch votes. The professional politician, of course, is an enthusiast on the subject. Delightful visions of hundreds of offices to be sold or given in reward for political services sharpen his zeal for public institutions.

A system which finds favor with socialists, demagogues and professional politicians, ought in itself to be sufficient to disgust every well-minded citizen who has the public good at heart.—*Editorial in Cincinnati Volksblatt.*

Electric Appliances for Theatres.

The adoption of electric illumination in theatres, and the consequent enhancement of the beauty of the scenic effects obtainable, has become very general in this country. At first the effects were crude and inartistic owing to the inefficient apparatus used for controlling the lights. A beautiful sunset effect would be spoiled by the dwindling of the rosy light by jerks, too perceptible to the audience not to cause laughable comment, the opposite result occurred when the increasing light was supposed to represent a sunrise. To obviate these objectionable features, the Edison General Electric Company has brought out a new stage regulator switch by means of which graduations of light are obtained fine enough to satisfy even the most fastidious of stage managers. This switch, mounted on a slate base, consists of 50 clips arranged in a circle in four divided quadrants with a four armed contact passing over them, and engaging in a clip every quarter width of the clip. Contact over the entire 50 clips is made by a movement of the switch handle through an angle of 45 degrees only, instead of through 120 degrees, as in all other stage regulators yet devised, and thus the speed of the operation is considerably increased. These switches are either directly mounted on the sides or the top of the fireproof stage regulators, or are mounted separately upon a switchboard and connected with the regulators by means of regular fireproof cables made up of the strands of the connecting wires. They can also be arranged in a special frame in such a manner that the handles can be worked separately, or connected together be all operated as one unit. We show in the cuts the original type of stage regulator switch, with the semi-circular row of clips, and, for purposes of comparison, the improved switch with the circle of clips divided into four quadrants.

Long Circuits.

It has been reported that the new cable between Florida and the Bahamas, a part of the circuit between New York and Nassau, New Providence, is "the first cable to be worked by the Morse system." That is incorrect, because, though working Morse on submarine cable circuits is something of a novelty from our coasts, very many cables in other parts of the world, most of them of much greater length than the new Bahamas cable, are worked by the Morse system.

The Morse system is very much less expensive than either the recorder or mirror system, and for that reason it is used wherever possible. On long cables, like those between America and Europe, Morse is not available, and the vastly more delicate and expensive recorder is used. The Commercial Cable Company works one of its cable circuits from this city to Cape Canso, Nova Scotia, with the Morse system and as a duplex circuit. The circuit is land line to Rockport and cable thence to Canso, about 800 miles. The length of the new Bahamas cable is only 300 or 400 miles at most. The old cable from Brownsville, Texas, to Tampico and Vera Cruz, on the old route to South America, was a Morse circuit. The route was abandoned some years ago and a recorder cable circuit from Galveston was substituted.

Probably the longest cable worked by the Morse system is the one from Bushire, Persia, to Kurrachee, India, which is about 1,200 miles long. It is a link in one of the two main routes from England to India. A circuit is worked direct from London to Marseilles, in the Mediterranean, the route being by cable across the English Channel and then across France *via* Paris. The cable from Marseilles to Malta is, or was, worked by the Morse system, so is the cable across the Mediterranean from Marseilles to Bona, in Africa. The Indo-European Telegraph Company works Morse on a 300-mile cable from England to Germany, in what is, perhaps, the longest regular circuit, and certainly the most remarkable one in the world. It runs from London to Germany, then through Russia, skirting the coast of the Black Sea, crosses the Caucasus mountains, and traverses Persia to Teheran, the capital, and thence to Bushire, a distance of about 4,500 miles. There are many short cables,

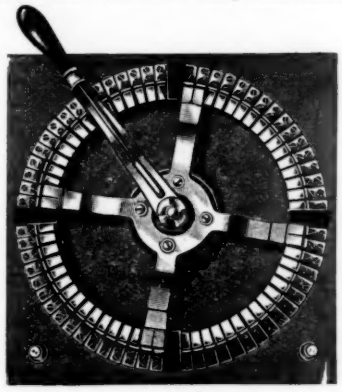


FIG. 2.—EDISON STAGE REGULATOR.

such, for example, as those connecting the islands of the Grecian Archipelago, in different parts of the great system of telegraphic communication that now touches almost every corner of the globe, that are worked by Morse, and on such cables Morse works much better than on a land line of equal length.

Another Consolidation.

The consolidation of the Gould & Watson Company, of Boston, with the Johns-Pratt Company, of Hartford, was consummated on the 22d inst. The mica insulation, made by the Gould & Watson Company, will now be manufactured at the Hartford factory of the Johns-Pratt Company. This company will hereafter make the Vulcabeston, Monarch and mica insulations. The H. W. Johns Manufacturing Company, of New York, Boston, Chicago, Philadelphia and Atlanta, will continue as selling agents.

TELEGRAPHIC

.... Edmund Le Barron Howard, telegraph operator at the Adams House, Boston, has fallen heir to a property of $60,000.

.... Mr. Milton Orr, who for several years has been manager of the postal telegraph cable office at Atlanta, Ga., has accepted a similar position with the same company at Savannah.

.... Manager F. F. Bradish, of the Commercial Union Telegraph Company, is making arrangements to extend the company's lines to Montpelier and Barre, Vt., taking in the intermediate stations.

.... Dr. G. P. Hachenberg's request to be allowed to exhibit his musical telegraphy inventions at the World's Fair has been referred to the department of liberal arts, which controls the musical exhibit.

... The capital stock has been subscribed for the telegraph line between Bowie and Solomonville, Ariz. The wires and poles have been ordered, and work will be commenced at once on the construction of the line.

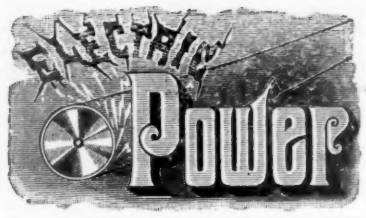
.... The Dark Continent is now completely encircled by submarine telegraph, more than 17,000 miles of cable having been employed in effecting it, and several companies, with more or less aid from the British, French, Spanish and Portuguese governments, have participated in carrying out the work.

.... The Governors of the New York Stock Exchange have decided to tax the New York Quotation Company $100 a day for the privilege of collecting the quotations on 'Change after April 1. The Quotation Company thereupon notified its patrons that, beginning with that day, the price for quotations to them would be $20 a month, instead of $10.

.... W. H. Gamble, for 25 years receiver of the Western Union Telegraph Company in San Francisco, died there recently. Mr. Gamble was a brother of James Gamble, formerly superintendent of the Western Union Telegraph Company, and had been connected with the corporation since 1854. He was very widely known throughout the coast. He was a member of the Telegraphers' Mutual Benefit Association.

.... The Western Union has again reduced rates affecting nearly 1,000 points in Illinois and 2,500 in Wisconsin, Iowa, Minnesota, Nebraska, Missouri and Kansas. Most of the changes affect minor points where there is little business to sustain the service, the reduction being from 50 cents to 40; while at about 100 points in each State messages to other points within the same State are cut from 40 cents to 25 cents.

.... A wager between a couple of brokers the other day resulted in an interesting experiment as to the rapidity with which telegraphing can be done between New York and London. It was settled by actual tests that a cablegram can be sent to London from the New York Stock Exchange and an answer received in four minutes. Ordinarily the time is much longer, but on this occasion a special effort was made, with the above remarkable result. From this it may be inferred that the cable service is as nearly perfect as it is possible to make it. The cable business is constantly growing, and at present nearly 900 messages are sent daily from New York to London between the hours of 10 and 12 o'clock. All the commercial business is done by cipher, and so condensed is the code that a considerable message can be sent at a comparatively small outlay. The regular tariff is 25 cents a word. The messages are sent by overland wire to Heart's Content, Newfoundland, where they are transmitted *via* the ocean cable to Valentia, Ireland, thence direct to London. The commercial business between the New York and London stock exchanges has become so extensive that three or four operators are now required constantly on the floor of the New York Stock Exchange to handle that business alone.



* * A company has been incorporated in Kingston, N. Y., to build an electric street railway in that city.

* * The John A. Roebling's Sons Company will rebuild the electrical building of their works, at Trenton, N. J., lately destroyed by fire.

* * Kendall & Slade, dealers in electrical goods, 134 Congress street, Boston, have assigned to Henry S. Milton, attorney, 10 Tremont street.

* * It is reported that the new business secured by the Westinghouse Electric Company during the first 17 days of March aggregated $1,000,000.

* * Huntingdon, Pa., has organized an electric street railway company. Samuel E. Henry is president, and 75 per cent. of the capital stock has been subscribed.

* * A party of Eastern capitalists are applying at the State Department at Harrisburg, Pa., for a charter to build an electric railway from Reading to Harrisburg.

* * A new electric railway will run from Chippewa to Queenston, Ont., carrying passengers and fruits between those points, and from Lewiston and Niagara on the lake.

* * A bill was recently introduced in the lower house of the legislature of Maryland, by Representative Hill, of Prince George's county, to incorporate the Baltimore and Washington Turnpike and Electric Tramway Company.

* * The New York State board of railroad commissioners, on March 22, announced a favorable decision upon the application of the Brooklyn City and Newtown Railroad Company for leave to change its motive power on the Franklin avenue line from horses to the overhead trolley wire system.

* * The stock of the Toronto Incandescent Electric Light Company, Limited, is selling on the Toronto Stock Exchange at 20 per cent. premium. This company commenced operations two years since, and now has a paid-up capital of $500,000. Six per cent. dividends have been paid since the start.

* * The Denver office of the Thomson-Houston Electric Company is to be greatly enlarged, three large storerooms in the building being required. Repair shops and a storehouse will be established in the city by the new company, so that every article of electrical apparatus can be obtained direct from this establishment.

* * The Maryland Senate took an entirely unexpected departure last week in unanimously passing over the Governor's veto the bill "to incorporate the Annapolis, Eastport and Bay Ridge Electric Railway and Power Company of Anne Arundel County." The incorporators of the bill are James H. Vansant, Edward Powers, James I. Johnson, Charles A. Dubois, W. Hallam Claude, Richard H. Green, Jr., Joseph H. Bellis, Nevitt Steele, W. Clement Claude, F. Eugene Wathen, George H. Carpenter, Geo. W. Silsby and George W. Wilcox.

* * The Eddy Electric Manufacturing Company, of Windsor, Conn., will begin their new building at once, or as soon as the contract for the work is awarded and the ground is in suitable condition. The addition will extend north of their present building about 155 feet and will be the same in width. A new 250 horse-power engine will soon replace the engine now in use, and new machinery will be added. The company has prospered from its organization, and especially since it located in Windsor. With a larger building they will require a much larger force of workmen.

250 Kilowatt "Mordey-Victoria" Alternator.

The Mordey-Victoria alternator shown in this issue was constructed by the Brush Electrical Engineering Company (Limited), of London and Loughborough, and is the size known as "A 20." This indicates that there are 20 polar projections on each side of the stationary armature of 40 coils.

The following are the principal figures as to the size and performance of the machine:

Output	250 kilowatts = 335 E.H.P. at 2000 volts
Number of revolutions	300
Twenty polar projections, 40 armature coils	100 alternations per second.
Weight of revolving magnet and shaft complete	15 tons.
Weight of complete machine	20 "
Drop in volts between no load and full load	4½ per cent. at constant excitation.
Rise in volts between full load and no load	5¼ per cent. at constant excitation.
Increase of excitation (amperes) required to maintain constant electromotive force from 0 to full load	12 per cent.
Excitation on open circuit (full electromotive force and speed, no current)	2,800 watts or 1.12 per cent.
Excitation on full load (full electromotive force, full speed, full current)	3,650 watts or 1.5 per cent.
Electrical efficiency at full load, including excitation	97 per cent.
Commercial efficiency at full load guaranteed by makers	93 "
Greatest width of each armature coil	7 1.16 in. = 9 deg.
Width of armature conductor	⅝ in.

The above figures we get from the London *Engineering*. The alternator is further described, as follows:

The armature is fixed, the supporting ring being divided vertically. The whole ring, or either half, may thus be withdrawn very rapidly. Such withdrawal is, however, not necessary, either for examination, cleaning, or repairs, as owing to the peculiar construction of the field magnet, any and every armature coil is fully accessible without the removal of any portion of the machine. Even when the machine is at work, owing to the persistence of vision effect, the whole of the armature is perfectly visible, as each coil is alternately covered and uncovered by the revolving magnet horns.

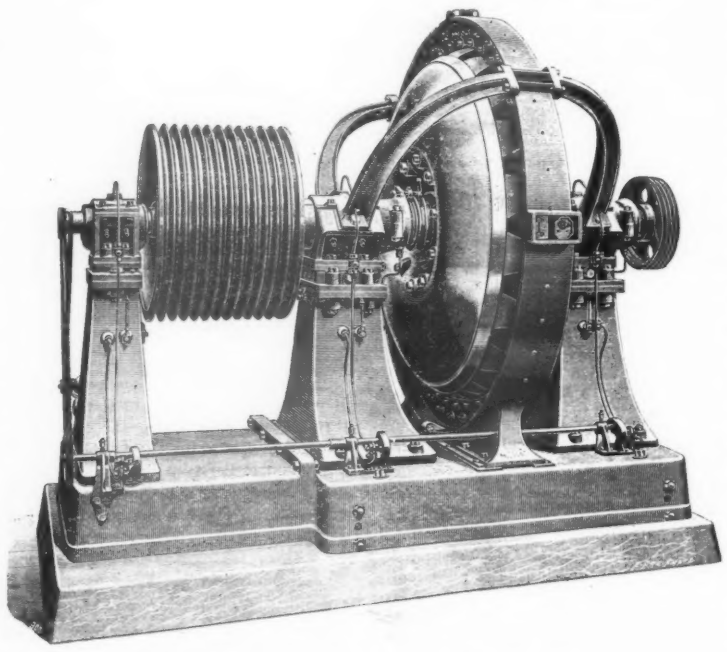
The existing current is supplied to the single coil of the magnet by a pair of collector rings (one ring on each end or side of the magnet), two brushes being arranged on each ring.

From the data given above it will be seen that the excitation is very small and that the amount of variation of the excitation required to maintain constant electromotive force is also small, while even if the excitation is maintained constant (that is, if no regulation is attempted), the electromotive force of the alternator varies only about five per cent., even if the full load is thrown on or off. These satisfactory features are common to all the alternators of this type, but we are informed that in none to quite so high a degree as in the machine under notice.

The lubricating arrangements deserve attention. There are three solid white metal bearings. Efficient and abundant lubrication is secured by means of force pumps. Each bearing pedestal forms a large oil reservoir, in connection with which is a small force pump, the three pumps being driven by a light steel shaft running the length of the bed-plate and belted to the magnet shaft. Oil is thus delivered under pressure to the bottom of each bearing. There is a by-pass tube with cock supplying oil also to the top. After circulating through the bearing, the oil finds its way from each end by a separate visible outlet, and then is conducted to a small gauze filter, so returning visibly to the reservoirs, which contain such a large quantity of oil that renewal is only necessary at long intervals. The amount of oil passing to each part of the bearing is readily observed, and by using a visible open return, instead of a visible feed, the advantage of a supply under pressure is secured, together with the advantage of visibility of supply.

Further, each bearing is provided with a water jacket space with connections for the attachment of pipes if necessary.

It will be noticed that the machine is made for 100 complete alternations, this being the standard rate adopted in all the apparatus of the Mordey-Victoria system. Great convenience results from strict adherence to this rate, not only on account of the parallel working of the alternators, but in connection with the design and construction of transformers, arc lamps, impedance coils and other accessories.



250 Kilowatt "Mordey-Victoria" Alternator.

"More Benefit Than in any Other."

An esteemed patron of ours, the Orne Electric Construction Company, Chicago, of which Mr. W. N. Wegg is manager, writes us, under date of March 21, as follows:

"Our advertisement in your paper was of more benefit to us than that in any other electrical paper in which we advertised. Hope that in the near future we will be able to give you a larger advertisement."

We extend to Mr. Wegg and the Orne Electric Construction Company the assurances of our most distinguished consideration, and would state that it is such kind words that bring sunshine to the heart of the business manager.

National Electric Light Association.

President James I. Ayer, of the National Electric Light Association, has already begun to make extensive preparations to entertain the delegates to the National Convention of the Association, which meets in St. Louis next February. Isaac Taylor, the architect who has charge of the building of the new Mercantile Club house at Sixth and Locust streets, has promised to complete the building by February in order that the convention can meet there. The faculty of Washington University, the Mercantile Club, St. Louis Engineers' Club and the Merchants' Exchange, will heartily co-operate in entertaining the delegates. President Ayer received a letter recently from Mr. E. R. Weeks, general manager of the Kansas City Electric Light Company, instructing Mr. Ayer to call upon him for any assistance he may be able to render in making the convention a success.

International League of Press Clubs.

The governing board of the International League of Press Clubs met in this city, at the Hotel Imperial, Thursday afternoon of last week. The president of the League, Hon. M. H. deYoung, of the San Francisco *Chronicle*, was in attendance, as were also Col. John A. Cockerill, Dr. John Friederich and Charles W. Price, of New York; T. J. Keenan, Jr., of Pittsburgh; H. P. Hall, of St. Paul; H. D. Vought, of Buffalo; John P. Dampman, of Reading, and William Berri, of Brooklyn. The entire afternoon was devoted to important business affairs of the League, and to the discussion of plans for advancing the interests and value of the organization. It was voted to establish a home for aged and infirm journalists, and Messrs. William Berri, John A. Cockerill and M. H. deYoung, were appointed a committee to carry out the work. Mr. W. V. Alexander, of the Boston *Transcript*, was elected a member of the governing board, to fill the vacancy caused by the resignation of Stephen O'Meara, of Boston. The *Journalist*, of New York city, was selected as the official journal of the League. Committees were appointed, and the board adjourned at 6 P. M. to meet in Chicago on October 11, at the Auditorium Hotel.

In the evening, at the Hotel Imperial, a particularly enjoyable banquet, which included the ladies, was given in honor of President and Mrs. deYoung and other press visitors. The occasion was gotten up by the New York Press delegates to the recent convention in San Francisco, aided by the officers of the New York Press Club. The floral and electric light effects presented in the beautiful Japanese parlor where the dinner was served were unique and particularly attractive. The beauty of the scene, the delightfully served dinner, the soft music, and the general pleasant social atmosphere that prevailed, made the occasion one to be forever remembered by the 40 ladies and gentlemen present. Col. John A. Cockerill presided, with Mrs. deYoung on his right and Mr. deYoung on his left. Miss Kate Field, who accompanied the party to San Francisco, Mrs. J. C. Yerkes, of Chicago, Mr. and Mrs. M. C. Roach, in addition to the visiting members of the governing board, were present. After the banquet the presiding officer, Col. Cockerill, expressed the appreciation of the New York Press Club over the courtesies that had been shown the representatives of that organization, on the occasion of their visit to San Francisco, by Mr. and Mrs. deYoung, and Mr. William Berri, Mr. John P. Dampman, T. H. Martin and Thos. H. Evans and others, spoke of the San Francisco trip. Mr. deYoung responded on behalf of himself and wife, and stated that the sentiment of the evening had impressed him more than any banquet or dinner he had ever attended, as it was based on friendship. Miss Jennie O'Neil Potter, Mr. Ernest Jarrold and Mr. A. E. Pearsall, contributed to the informal entertainment of the evening. Mr. Marshall P. Wilder telegraphed from Buffalo his regrets and best wishes. The party separated at midnight, after listening to a delightful recitation by Mrs. deYoung.

The occasion was one unique in the history of New York banquets, in that it included the ladies. This is but carrying out one of the ideas of the International League of Press Clubs, which includes in its membership the leading woman's press organizations of the country.

Saturday afternoon a reception was given Mr. deYoung by the New York Press Club. There was a large attendance, and the New York press workers all enjoyed meeting one of the most successful and capable members of their profession.

New York Board of Electrical Control.

Mayor Grant announced at a meeting of the Board of Electrical Control, which was held in the Mayor's office, March 25, that the efforts of Public Works Commissioner Gilroy to have the work of subway building done with some regard to the work of repaving streets would be continued this year. He intimated that any inclination on the part of anybody to tear up streets that have been newly paved would be strongly curbed.

On a motion made by the Mayor, Engineer Kearney was instructed to report at the next meeting of the Board the streets in which subways are to be built and just how many of these streets are to be repaved.

The Austin & Meyers Electric Motor.

Messrs. Austin & Myers, Armley, Leeds, England, have brought out a series of motors which present many features of interest. Referring to the engravings, Fig. 1 shows the motor complete, and Fig. 2 shows the same machine taken to pieces. It will be seen that the armature runs on roller bearings, the rollers being really rings. Many dynamo makers have thought of using roller or ball bearings, but Messrs. Austin & Myers are said to be the first to carry the idea into practice. The next point deserving attention is the brush mechanism. The brushes are fed in radially, without lead or trail, by a peculiar cam controlled by a spring. The motor is specially designed to work with little attention, the roller bearings being adopted so that no harm is done if they are not oiled for some time. The brushes are arranged so as to demand no attention. This motor is made in all sizes,

Fig 1.—View of Motor Complete.

from a miniature one weighing only nine pounds, which will rest on the palm of the hand, up to five horse-power. We are indebted to our London contemporary, *Industries*, for the illustrations.

An Electrical Letter Box.

A very ingenious automatic machine has been established near the letter box at Charing Cross station, London, for the collection of letters to be forwarded by the post office express service. It is in electrical connection with the postal telegraph office, opposite the station. By dropping a penny in the slot, and pulling out the slide, a brown colored envelope is delivered. This envelope contains another envelope and a card. The communication is intended to be written on the card, which is then inclosed in the white envelope, and this, with the fees for delivery, which have been fixed at three pence per mile, is re-inclosed in the outer envelope and deposited in the box behind the flap, which bears the printed instructions. The act of withdrawing the slide sends the call signal to the telegraph office, and a messenger is at once dispatched to collect the special letters.

Punkah Pulling by Electricity.

That electricity is a great economizer of manual labor will be admitted, we presume, by everyone, even by the gas companies. In hot climates anything that saves labor of this kind is obviously a great boon, and we have no doubt that the new electric punkah, says the London *Electrical Review*, will prove a peculiarly grateful luxury in the torrid climate of the East Indies. This novelty is due to F. J. Agabeg, and presents the following essential features: The punkah is pivoted longitudinally over the bed (if it be used in the sleeping apartments) and vibrates in an arc from 150 to 160 degrees. By means of an ingenious link motion, the fan gets a slow and quick movement alternately, which exactly imitates the jerk and swing-back of the ordinary punkah as manipulated by coolies. The electric power is furnished by batteries, the cost of which for from 18 to 20 hours is said to be about the same as that which would hire two coolies for the purpose. The electric punkah may be arranged to fan the air over dining tables as well as beds, and the comfort of dispensing with the attendance of the coolies, while the fanning proceeds uninterruptedly, will doubtless bring the invention into popularity in India. It is stated that the battery cells which work the punkah are also capable of lighting up a three to four candle-power electric light at the head of the bed, so that, if desired, the occupant may read with perfect comfort and safety. There are no details at hand respecting the battery, unfortunately.

Canada's Big Belt.

The largest driving belt ever manufactured in Canada is that which is now almost finished and to be seen on a monster 60-inch hydraulic press (erected for the purpose) in the leather belting manufactory of Messrs. Robin & Sadler, 2530 Notre Dame street, Montreal. This belt, when finished, will be placed in position on the driving pulleys of the Royal Electric Light Company's new engine at the establishment on Wellington street and will transmit 800 horse-power. It is made without a rivet and is a solid mass of leather, three-ply, cemented together by a pressure of 30 tons weight from the press. Its width is 53 inches; length 130 feet and about an inch in thickness and of 2,000 pounds weight. The outsides of the belt are without a patch, while the whole contains 100 steer hides selected as to superiority from a collection of over 2,000. From the press the belt will be submitted to a special process, known only to this firm, whereby the surface will be made proof against oil absorption, when it will be ready for use. This firm is also manufacturing a belt 40 inches wide, three-ply, for the Royal Electric Company's new 600 horse-power engine.

Westinghouse.

The buying of Westinghouse has again been conspicuous this week, says a Boston paper, and the principal buyers have again been Brown, Riley & Company. This movement in Westinghouse is of profound significance. The Congress street house has purchased for German interests, in all probability for the Siemens-Halske people. Siemens, Halske & Company, it will be remembered, is the name of the big German electrical company which proposes to establish immense works at Chicago. The friends of the Westinghouse Company hint at a possible union with the German company and claim that such an alliance would be mutually beneficial and, at the same time, place

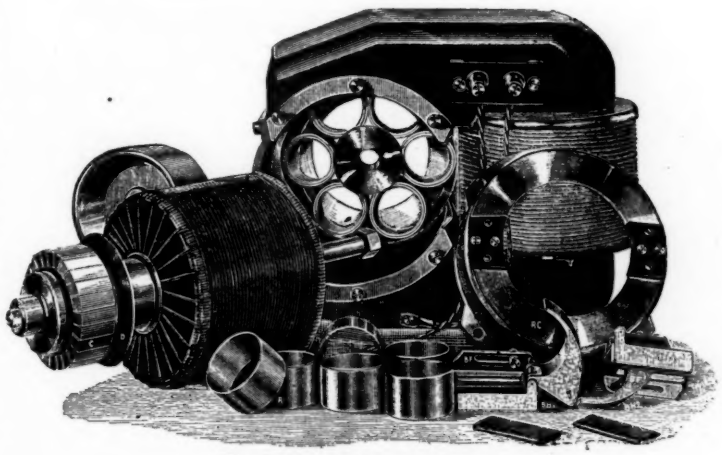


Fig 2.—View of Details of Motor.

them in a position to make competition very uncomfortable for the General Electric Company of America.

But buying of Westinghouse stock this week has emanated from other quarters than Congress street. It has been remarked that small brokers have offered to take 1,000 share lots of the new Westinghouse stock at a figure very close to the market price. Now these little brokers never buy in that manner for themselves, so the buying is credited to other and more powerful sources, to none other, in fact, than the Thomson-Houston people.

The Westinghouse people say that they will not enter the consolidated company on any other basis than par, 50, for their stock, and, consequently, it follows that if the Thomson-Houston interests mean to acquire control, they will purchase as many shares of stock at present market prices as possible. Somebody is buying for control; the question is, will it be the Thomson-Houston or the Germans who will acquire it? In the meantime, higher prices are looked for on Westinghouse.

A Big Electric Railway System.

At Concord, N. H., the people have evidently become possessed with the idea that the West End Railroad of Boston is an octopus, for, in a despatch to the Boston *Post*, it is intimated that the West End "is reaching out over the land to possess it," and that the Lowell, Lawrence and Haverhill electric railroad scheme is a part of the plan. Lowell does not care much who builds the roads so long as good service is rendered and the city is benefited by the same. We quote from the *Post* despatch as follows:

"Its latest scheme is a system of short lines, which shall constitute a Merrimack Valley system, extending from Newburyport to the capital of New Hampshire. Already a part of this plan is in sight before the Massachusetts legislature, in the form of petition for two of these short lines. These are the Lowell, Lawrence and Haverhill and the Haverhill and Amesbury Street Railway Companies.

"These two lines would make a continuous system from Lowell to Amesbury, and a line is also projected from Lowell to Nashua and from Nashua on to Manchester and this city. A bill has been reported in the Massachusetts legislature for the construction of the Haverhill and Amesbury link, and it is said that the other link from Haverhill to Lowell will be favorably reported upon."

The Storage Battery.

Judge Green, of the United States Court for the District of New Jersey, has handed down a decision in the case of the Brush Electric Company and the Consolidated Electric Storage Company, complainants, against the Accumulator Company, defendant, in which he found for the complainants, and ordered that an injunction issue against the defendant. The injunction was issued March 19.

It will be remembered that the complainants above obtained a perpetual injunction last December against the Electrical Accumulator Company, of New York. This company, however, has ceased to exist any longer, and was succeeded nearly two years ago by the Accumulator Company, which is incorporated in New Jersey. The complainants above were, therefore, compelled to go before the United States Circuit Court in New Jersey in order to obtain an injunction against the Accumulator Company.

The argument was had before Judge Green on the 7th of January last, so that it may be inferred that the court gave the case considerable thought and study before rendering the decision that has just been handed down. The practical result of this decision is that the Consolidated Electric Storage Company succeeds to all the business of the Accumulator Company, and so far as maintenance of the present installations for street cars, railway train lighting, domestic lighting and all other kinds are concerned. It will be remembered that this is the fourth decision sustaining the patents of the Consolidated Electric Storage Company, to wit: the Brush patents.

—— The Warsaw, N. Y., Gas Company has voted to put in an electric light plant in connection with its gas plant.

ELECTRIC LIGHT NEWS

—— The electric lights at San Angelo, Tex., are now run by water power.

—— The electric light company at Jeffersonville, Ind., intends to establish an electric railway.

—— James Kenworthy will organize a new light, heat and power company at Norristown, Pa., on April 2.

—— A special committee of the Rochester, N. Y., city council recommends that the electric wires of that city be placed underground.

—— The city of Lewisburg, Pa., has closed a contract with the Washington Construction Company (Pardue & Messner), of Washington, D. C., to furnish arc and incandescent lights for a term of five years.

—— The Salem, Mass., Electric Light Company is to pay a quarterly dividend of one and one-half per cent. April 1. The company is also soon to put in a new engine, which will give their plant a total capacity of 1,400 horse-power.

—— The recent consolidation of the Seattle, Wash., electric companies into the Union Electric Company has done away with the necessity of maintaining as many poles and wires as formerly. About 350 poles will be removed.

—— An attempt to blow up the electric light plant at Fenton, Mich., was discovered recently. The engineer, in cleaning the dynamo, found on the armature a package of dynamite mixed with sulphur in sufficient quantity to destroy the whole building.

—— George Hiles, of Milwaukee, Wis., has instituted proceedings to have a receiver appointed for the Milwaukee Power and Lighting Company, alleging that the company is insolvent. Mr. Hiles is the principal creditor, and his claim of $27,500 is secured by mortgages.

—— The electric light plant at Martin's Ferry, O., was burned one night last week. The plant was owned by the Martin's Ferry Construction Company and furnished power to the street car line, which will have to discontinue operations until the plant is rebuilt. Loss about $10,000.

—— Governor Abbett, of New Jersey, signed last week one of the most important corporation bills passed by the recent legislature. The new law taxes telegraph, cable, telephone and express companies two per cent. upon their gross receipts; gas and electric light companies half of one per cent. on their gross receipts.

—— It is reported that the governing committee of the Boston Stock Exchange has decided that all quotations for Westinghouse Electric hereafter must be for new stock and not for receipts. As only about one-third of new stock is actually issued, this order is likely to hinder the trading. Effort will accordingly be made to have it countermanded.

—— The Vincennes Electric Light and Power Company, of Vincennes, Ind., H. W. Frund, manager, have added to their plant one 1,300 light alternator, one Armington & Sims double disk 130 horse-power engine, two No. 4 Blake pumps, one large boiler and heater separators, etc. The newly elected officers are Chas. Bierhaus, president; H. W. Frund, secretary and manager, and H. A. Foulks, treasurer.

—— At the annual meeting held by the directors of the Binghamton, N. Y., Electric Company, the following officers were elected for the ensuing year: President, M. L. Keyes; vice-president, Geo. F. O'Neil; secretary and treasurer, S. C. Normile. Directors, George F. O'Neil, G. W. Dunn, M. L. Keyes, Floyd Kenyon, F. D. Miller, Frank Gould. Mr. S. C. Normile, under whose excellent supervision the company has prospered, will be retained as manager.

The Practicability and System of Air Conveyance.

BY CHARLES G. LOEBER.

The idea of conveyance through the air originated in the crude conception of flying long before the Christian era, at a time when little or nothing was known of the laws and forces of nature. Nevertheless, that idea has come down to our time developed to the conception of air conveyance by means of vehicle, while countless other ideas have been exploded, and to-day its eventual realization is looked for by the intelligent throughout the civilized world.

The conception and development of that idea are readily accounted for. The wonderful feats of the bird in the air incited man to the idea of flying—to assert his ascendency over the feathered brute, just as considerations of safety and mastery impelled him to the invention of the deadly weapon to vanquish the fierce quadruped. Naturally enough, he attempted the execution of the idea, and though he did not succeed, the very failures became additional incentives to renewed efforts, until, at last, the wonderful invention of the balloon gratified his ambition to reach the clouds. The balloon thus embodied the idea of air conveyance by vehicle, and since late years the idea has assumed more practical shape. The balloon has come to be recognized as only a partial success; none the less air conveyance has obtained a firm hold upon public sentiment, and to-day it is unanswerably argued that the air, like steam and electricity, is for our use on the condition that we obtain such use as we obtain everything else in nature, namely, by our own effort, and that with the ever present object lesson of flight before us, it will be but a matter of time and growth for the mind, with its unlimited creative power, to discover and apply the means and conditions with which man will master the brute in air as he has long since mastered it on land.

The achievement of air conveyance is a physical feat which involves the use of an air vehicle and the application of mechanical power, both conformably to natural law. This law requires the air vehicle to have weight of body; that is, the same proportion of weight to volume of body with the land vehicle. Locomotion requires locomotive power, and, reciprocally, locomotive power requires locomotive work; this consists in the continuous disturbance of the adhesion of the locomotive body to its element of locomotion, here the air, and this adhesion results from and is proportionate to the weight of the locomotive body, here the air vehicle. Hence, if this weight is disproportionate to volume, so as to result in levitation of vehicle, then the locomotive power becomes, to that extent, useless for want of work, while, also, the air vehicle is rendered unable to cope with the resistance to be encountered in speed and from other causes. Therefore, in air, as on land, the weight (gravity) of the vehicle is at once the main impediment and indispensable requirement to its propulsion. Let it be noted, then, that natural law condemns the balloon and, indeed, any air vehicle that floats, whether by means of a lighter substance than air or by means of a vacuum.

Requiring thus the air vehicle to have heft, natural law further requires an additional factor besides propelling power, in order that this may effect the propulsion of the air vehicle. If this factor is known at all, it certainly has never been explained; moreover, in all the published attempts at air conveyance, made and contemplated up to the present time, that factor is entirely ignored. I have named it fulcrumage, and it is that which causes the propelling power to act against the vehicle. In land conveyance fulcrumage is obtained by the adhesion of the vehicle to the ground, resulting from its weight. But in air conveyance fulcrumage is afforded by the air, and it is the bearing, sustaining, by the air of the propelling power, which is so applied as to be exerted against the air, and, through its sustenance by the air, to act (react) against the air vehicle.

We have seen that natural law requires a heavy vehicle and fulcrumage in air as well as on land, and in its very nature the fulcrumage of the air must be adequate to render air conveyance practical. Fortunately, it is adequate and without slip, as the numerous phenomena of birds of prey in the air, such as soaring, carrying prey, often heavier than the bird, at a speed of more than 100 miles an hour (both being feats of the vulture), conclusively attest. I will endeavor to further explain this. With the dawn of physical knowledge, it came to be gradually perceived that the atmosphere is a physical substance and, as such, susceptible of investigation. And in the seventeenth century two inventions were made cotemporaneous and closely related to another, the importance of which, it is safe to say, is not, even to day, yet appreciated. I refer, of course, to von Guericke's air pump and Torricelli's vacuum barometer. This last invention discloses the air as a potent force, while the first brings forth the means, namely, vacuous space, through which the atmospheric force is obtained. It is only comparatively recent that those inventions have been turned to the practical account of utilizing atmospheric air, by means of the vacuous tube, as a force for the conveyance of light freight over short routes, and that use of the air is even now contemplated for the postal service between New York and Brooklyn. Yet, in oblivion of these facts, the air is still regarded by all the world as nothing better than a highly tenuous fluid, which is unable to bear weight greater than itself, and which resists force only in proportion to the velocity of impact. A contemplated invention of air conveyance—which the writer here singles out because its author is one of the most intelligent of aeronautic aspirants—is predicated upon the assumption that it requires one horse-power to merely sustain in the air a 200 pound weight; and, while that author claims success for his invention, he distinctly disclaims being able to carry passengers for a long time and freight ever. Of course, his invention ignores fulcrumage, and is to be built in Paris, because, as he tells us, that city exclusively affords the facilities for that purpose. (Any locality in the United States having the facilities for building a steam engine is suitable enough for building the writer's invention of air car.) Thus, notwithstanding the inventions and discoveries already made about the air, its mechanical character is still totally misapprehended.

But it is only in its normal state of rest or equilibrium that the air is impotent. Subjected to the condition of vacuous space, the air becomes a potent force by reason of its inherent energy to rush into vacuous space with the enormous estimated velocity of 1,300 miles in an hour; and if the air is prevented from entering vacuous space, it exerts against such resistance a pressure of 2,116 pounds to the square foot.

It stands to reason, however, that the air, having such a potent energy, is also able to sustain a force equal to that which, by means of the vacuum, it exerts. Nor is it remarkable that there should be means through which the air sustains force, and that such means should be obtainable by art, any more than that vacuous space is the means through which the air exerts force, and that these means are obtainable by art. In other words, while there are means through which the atmosphere becomes a potent force to the extent above stated, there are also means through which the air becomes unyielding to force to an equal extent. This unyielding state of the air, and the means for obtaining it, the writer has discovered and named anthexis, from the Greek, meaning that which sustains force without yielding. Anthexis, like the density and force of the air, decreases with altitude, sustaining at sea level a force of 2,116 pounds, and at a height of 20,000 feet a force of 1,100 pounds to the square foot of impinged air. It remains to add that I have sufficiently tested the means for obtaining anthexis to be sure of their efficacy; that these means are embodied in wings, propelling machine and rudder of my invention of air car, and that through those means I obtain anthexis underneath the wings and against the propelling machine and rudder—that is, the atmosphere becomes unyielding to the weight of the wings, plus the weight of the air car which rests upon the wings, and plus the fulcrumage required for the ascent and descent of the air car; and the atmosphere becomes, likewise, unyielding to the power of impact exerted through the propelling machine and rudder. And to what I have herein said in explanation of anthexis I scarcely need add that the means for obtaining it are other than force; moreover, those means are constant, permanent, not liable to be impaired, yet readily replenishable.

Given anthexis, construction and dimensions of air car, its equilibrium in the air, its carrying capacity, its ascent, descent and speed and other conditions are suggested as matters of course by the emergencies of use, if not by my mechanical invention, through which anthexis is utilized. And being thus matters of technical routine, they form no necessary part in the description of the physics of my system of air conveyance.

Brooklyn, March 26, 1892.

On the Correlation of Electricity With Heat.

[S. Tolver Preston in London *Engineering*.]

The identity of electrical disturbances with light has been a good deal commented on. But it may occur to one whether the correlation of electric phenomena with heat would not be a more practical view to lay stress on. For light is recognized to be only a particular phenomenon of heat; a wave of light being merely a wave of heat of the particular length adapted to affect the retina. To correlate electrical disturbances with optical effects only would seem, then, a rather narrow or exclusive point of view (if it alone were taken).

In treating some of the parallelisms between heat and electricity, perhaps the most important element—the waves—will occur to one first. A disturbance of any kind can scarcely take place without shaking the ether, which pervades and surrounds everything. The disturbances chiefly observed by us are of a pulsatory character, for the reason, no doubt, that in order to permit the parts of bodies to be in motion, and yet that these parts may not deviate from their positions to our eyesight, they must either oscillate or rotate about their centers of gravity in small excursions, and this pulsatory motion gives rise naturally to *waves* in the surrounding medium.

Now it is a recognized consequence of Maxwell's established electro-magnetic theory that all ether waves, however generated, are similarly constituted or the same in kind, whatever their length (or period). We may commence with the ultra violet of the extremity of the spectrum, and, passing through the "optical" rays, go to the obscure heat rays lying beyond the red, without breach of continuity. But ether waves of all lengths exist, and we cannot end here; we can analyse and isolate waves gradually longer, until waves, inches, feet, or more in length are reached, such as dynamo machines generate. Whether glass prisms or prisms of pitch be employed as refracting media, there is no breach of continuity in the waves, *all of the same kind*, whether thousandths of an inch long, or even miles long, through a certain extent of range, where a prism of glass or translucent substance is employed, these ether waves are commonly designated waves of heat; but in view of the late discoveries of Hertz, etc., may we not, impelled by a kind of logic, ask where do the waves of heat end? For there is no point where it can be said, here is a breach of continuity—where the waves commence to differ in kind. All other waves can probably produce heat under suitable conditions in fitting media; may it not be legitimate, then, to call all waves generated in ether "waves of heat" irrespective of whether the refracting substances they traverse be translucent or not?

For the waves evolved from a rotating dynamo armature are (according to the above suggested correlation) only waves of heat of greater length, and it is surely more simple to regard the heat produced in the wire constituting the circuit as *directly* generated by the waves, *i. e.*, by waves of heat, than to regard the action as due to something ("electricity") being *converted* into heat. There is no conversion, according to the above view, but merely the production of heat direct by waves of heat, which have, however, too great a length (too slow a period) to throw the molecules of the wire readily into vibration, and the greater or less facility with which this is achieved within the substance of the material may be said to constitute one difference between what is called a good and a bad "conductor." A fairly efficient conductor, as it seems, chiefly reflects and partly absorbs the particular wave length concerned. The less the absorption (or heat evolution), the more perfect is the "conductor."

No doubt the long ether waves which oscillate about an "electric" circuit, or constitute one, are in a form more or less *stationary*, from the mutual reflection inevitable in a closed circuit; but this becoming stationary is clearly not an exclusive characteristic of long ether waves. Far shorter waves (say the waves of "obscure" heat, so termed, about $\frac{1}{10000}$ inch long only) can also, under obviously known suitable conditions, become stationary by reflection; and probably even the analogy of the circuit here exists, also, as we hear speak aptly of the "surgings (of ether) in circuits of atomic dimensions." At any rate, it would be curious if the capability of becoming stationary, whether in or out of a circuit, belonged to one length of ether wave more than to another. Heat, then, in an "electric" circuit is generated directly by heat waves of a particular length absorbed laterally into the (generally) solid material which forms the axis of the circuit—and this heat is not generated by something else, as we would more simply put the matter. To say that electro-magnetic waves evolved by dynamo machines are not hot to the touch, and to imply thereby that they are not waves of heat, would be (as it appears to us) much like implying that invisible ultra violet waves, say, are not heat waves, because they do not burn. But they can produce heat in suitable media, and no one doubts that they are waves of heat of a particular *length*. So waves generated by a revolving dynamo armature (waves of heat as we regard them) can, under fitting conditions, produce heat in the interior of metals without necessarily generating heat indiscriminately in any object. The media are everything. Thus, for instance, those short waves, refrangible by glass, which have been particularized as waves of "obscure" heat (although the waves evolved from dynamos are equally "obscure"), are not hot to a dark solution of iodine in bisulphide of carbon, but on emerging from this liquid which they have traversed, these waves can set fire to a piece of wood, etc.

It seems probable that a not inconsiderable portion of the sun's energy is being spent in long ether waves—inches, feet, or more in length. For, doubtless, the general vibration in the solar nebula (whereby the ether pervading it is thrown into "resonance" of various periods) emits waves of every length—all of them, according to the view here suggested, waves of heat without assignable breach of continuity.

It may be a curious point to note the reaction of back pressure, amounting, doubtless, to millions of tons, on the solar surface (existing as a necessary consequence of the electro-magnetic theory), due to energy propelled off in the form of waves, may be a sufficient cause for accelerating or retarding the sun's proper motion in space. For it is indefinitely unlikely that the emissive power of the sun is uniformly the same all round, or all over the solar surface.*

There is a tolerably obvious correlation between some phenomena of heat and sound which may be worth noticing just in passing. Sound waves can, of course, be produced either by the vibration of a solid body (take a tuning-fork) or by the vibration of the medium itself which transmits the sound. This is often distinctively called "resonance" without there being an essential physical difference in the mode of generation of the waves, since the waves generated in the two cases are the same. Thus, for instance, either a vibrating solid (a fork) or the air column in an organ pipe, can give exactly the same musical note, indicating the same physical characteristics in the waves.

As with air, so with ether. A wave of heat may be generated either by a vibrating molecule (*i. e.*, by the pulsations of a piece of matter of constant mass), or it may be generated by the "resonance" of a portion of ether, *i. e.*, by the pulsations ("surgings") of a portion of the medium itself which transmits the wave. Waves of the last character, due to resonance of ether or "ether surgings," are most often met with in "electro" experiments so-called. These, however, may be logically viewed as waves of heat of a particular length; and waves produced by resonant ether (surging about in visible masses which ether pervades) may differ no more in character from those emitted by vibrating molecules than the waves evolved by the resonant air in a pipe differs from those generated by vibrating solids, such as forks. Heat waves of all lengths can be produced as well by resonance of ether as by the vibrations of more or less rigid bodies (such as molecules, etc.), just as—to follow the parallelism—sound waves of all lengths are producible either by resonant portions of air or by oscillating solids.

* The stress is calculable at 27 grains per square foot of the polar surface, and it is the same (as may be observed) as the stress on a belt carrying off the same power, viz., 7,000 horse-power, from the same unit of surface, at the same velocity—that of light. It is well known that the wave energy emitted from the sun is approximately equal to 7,000 horse-power per square foot.

KIND WORDS.

ANOTHER LIST OF SELECTED LETTERS AND PRESS COMMENTS ON OUR DECENNIAL NUMBER.

The ELECTRICAL REVIEW has received so many kind expressions of goodwill on its Decennial Number from its electrical friends and friends of the press, that it would require a very large volume, indeed, to publish them in full. We have given our readers a few of these in the past two or three issues, and this week present an additional list in which we very naturally take particular pride.

"Exceedingly Interesting."

FROM MR. MORRIS F. TYLER, SOUTHERN NEW ENGLAND TELEPHONE CO.

To the Editor of ELECTRICAL REVIEW:

My Dear Sir—I have delayed acknowledging the receipt of your Decennial Number till I could read and examine it with some care. I beg to tender you my congratulations upon the complete success of the undertaking. The issue is exceedingly interesting to any one, but particularly so to one concerned in any department of electrical industry. The statements concerning the rise and growth of the electric light and the telephone business are very accurate, so far as my knowledge enables me to check them.

I think you are particularly to be felicitated upon the choice of subjects for your portraits, and upon the success with which those you have produced have been executed. I am yours very truly,

MORRIS F. TYLER.

New Haven, March 14, 1892.

Unequaled.

FROM COL. GARDINER C. SIMS, ARMINGTON & SIMS ENGINE CO.

To the Editor of ELECTRICAL REVIEW:

My Dear Sir—I think the Decennial Number of the ELECTRICAL REVIEW was excellent and I cannot recall ever having seen anything its equal. My picture and biography was unlooked for and a most agreeable surprise, for which accept my thanks.

Business with us has never been better, and, with best wishes for your continued prosperity, believe me, sincerely yours,

GARDINER C. SIMS.

Providence, R. I., March 12, 1892.

"Handsomest."

FROM MR. A. S. BROWN, SECURITY INSULATOR CO.

To the Editor of ELECTRICAL REVIEW:

My Dear Sir—Your Decennial Number of the ELECTRICAL REVIEW, which was recently received, is certainly one of the handsomest publications we have ever seen. Please accept our most hearty congratulations for your success during the past ten years and with cordial wishes for your continued prosperity, we remain,

Yours very truly,
Security Insulator Co.,
A. S. BROWN, Secretary.

New York, March 16, 1892.

"Principal Paper of its Kind."

[*From Western School Journal.*]

The ELECTRICAL REVIEW, published at 13 Park row, New York, celebrated its tenth year by issuing a beautiful number on February 20. The REVIEW is the principal paper of its kind in the United States, and is edited by Chas. W. Price.

"An Excellent Illustration of Progress."

[*Toledo Bee.*]

Ten Years of Electrical Progress is the announcement on the title page of the magnificent Decennial Number of the ELECTRICAL REVIEW. The paper has a number of interesting special articles from the pens of such widely known electricians as John A. Barrett, William Bracken, J. J. Carty, C. M. Morse and John P. Gavit. The issue is an excellent illustration, not only of the progress in electrical appliances and inventions during the past ten years, but is a monument to the energy, perseverance and ability of its wide-awake editor, Mr. Charles W. Price, who, in an introductory article, truly says of the paper:

"It presents to its readers in this Decennial Number an electrical feast. The history of the REVIEW is practically a history of electricity. It has witnessed the growth of the telephone, the electric light and electric railroads, and discussed with enthusiasm every step forward. It has recorded the 10,000 and more inventions which have contributed to the great progress of the art."

"Most Noted Journal."

[*New Albany, Ind., Ledger.*]

One of our most noted journals of electrical science, the ELECTRICAL REVIEW, recently celebrated the opening of the tenth year of its publication by issuing a special number containing a review of the electrical progress during the decade. The period covers the achievements of electric lighting, the development of electric power and the inauguration of electric railways.

"Model of Elegance."

[*From the Phonogram.*]

The Decennial Number of the ELECTRICAL REVIEW is a model of elegance, both in matter, garb and illustration, while the perfection of its printing gives it special value to readers. It is a great credit to its enterprise.

"Delighted With It."

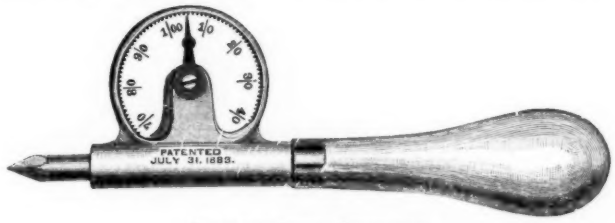
[*Minneapolis Telegraph Journal.*]

We are in receipt of the Decennial Number of the ELECTRICAL REVIEW and were delighted with it; the contents are such as will find interested readers among all workers with electricity. Any telegrapher wishing to secure a magazine that will aid him in securing a more complete knowledge of the science of electricity, we would advise to subscribe for the ELECTRICAL REVIEW, New York city.

"Surpasses Anything Ever Published in the Interest of Electricity."

[*Cincinnati Commercial Gazette.*]

Mr. Stephen L. Coles, of New York city, is visiting his father, the well-known attorney, here. Mr. Coles is a young, energetic and progressive journalist, a Cincinnatian by birth, and though still a young man, is now the associate editor of the ELECTRICAL REVIEW, one of the brightest scientific journals in this country. The Decennial Number surpasses anything ever published in the interest of electricity, and its editors are justly proud of its success, and are heartily to be congratulated. Mr. Coles will remain but a few days longer, when he returns to his duties in New York.



FOWLER'S SPEED INDICATOR.

"Handsomest of its Kind."

[*Buffalo News.*]

The Decennial Number of the illustrated ELECTRICAL REVIEW, a journal of scientific and electrical progress, is the handsomest number of its kind that has ever come to the *News*. The editor is Charles W. Price, of New York, and the work throughout shows the touch of a careful and skilled hand.

"That Admirable Journal."

[*Safety Valve.*]

Have you seen the Decennial Number of that admirable journal, the ELECTRICAL REVIEW? Besides being a marking post on the highway of its own success, it contains an accurate measure, not only of the progress of electrical development, but as well of the highest standard of excellence to which typography, engraving and editorial art has yet attained. It is a compendium of electrical knowledge and the manufacturing trades, and should be read and taken home by the power user as well as by the student.

Fowler's Speed Indicator.

The illustration shows Fowler's patent speed indicator, one of the cheapest and best devices of the kind on the market. It is simple, accurate and compact, and registers up to 5,000 revolutions, either right or left hand. The index point can be adjusted to zero with the finger, instead of tediously turning the dial all around to reach that point. Fowler's indicator is well made and does not easily get out of order. An extra hardened point, six inches long, can be furnished with the indicator for use on dynamos and motors.

Moonlight Schedule for April.

The following schedule was calculated on the basis of light one-half hour after sunset and one hour before moonset. Extinguish one hour after moonrise and one hour before sunrise. The schedule obtains for the whole of the United States.

APRIL, 1892.

Day of Month.	Light.	Day of Month.	Extinguish.	No. of Hrs.
	H. M.		H. M.	H. M.
1	P. M. 10.50	2	A. M. 4.40	5.50
2	" 11.50			4.50
3		3	A. M. 4.40	
4	A. M. 12.50	4	" 4.40	3.50
5	" 1.40	5	" 4.40	3.00
6	A. M. 2.20	6	" 4.40	2.20
7	" 2.50	7	" 4.30	1.40
8	" 3.20	8	" 4.30	1.10
9	No light.	9	No light.	0.00
10	No light.	10	No light.	0.00
11	No light.	11	No light.	0.00
12	P. M. 7.00	12	P. M. 8.10	1.10
13	" 7.10	13	" 9.10	2.00
14	" 7.10	14	" 10.10	3.00
15	" 7.10	15	" 11.10	4.00
16	" 7.10	17	A. M. 12.10	5.00
17	" 7.10	18	" 1.10	6.00
18	" 7.10	19	" 2.10	7.00
19	" 7.10	20	" 2.50	7.40
20	" 7.10	21	" 3.30	8.20
21	" 7.10	22	" 4.10	9.00
22	" 7.20	23	" 4.10	8.50
23	" 7.20	24	" 4.10	8.50
24	" 7.20	25	" 4.10	8.50
25	" 7.20	26	" 4.10	8.50
26	" 7.20	27	" 4.00	8.40
27	" 7.20	28	" 4.00	8.40
28	" 7.20	29	" 4.00	8.40
29	" 9.40	30	" 4.00	6.20
30	" 10.40	May 1	" 4.00	5.20
			Total,	148.50

Few Wires to Cut.

It was very lucky for the St. Louis firemen that there were so few wires around the Liggitt & Meyers tobacco factory. Only one fire alarm loop and one electric light wire ran into the building, and the telegraph and telephone wires had been strung along by the company, as it happened, on the streets on both sides of the factory. City Electric Light Inspector Andrew J. O'Reilly ran over from the City Hall when he heard the alarm for the recent serious fire, and was up on the little building next the factory, moving about with the firemen, his body glistening with ice. Chief Inspector J. D. Cull and Inspector C. W. Heeg, of the Municipal Electric Company brought five men up to cut the wires, but they had only the two to get out of the way, and with J. H. Burke, the Missouri's inspector, they got off in the doorway of the Exposition to watch the fire and congratulate themselves. "It's been the luckiest fire for the electric companies we've ever had," said Inspector Cull, as he stood there belted with cutting instruments and with his climbers jingling as he moved. "No other building in town could have burned with so little injury to us."

Government Contract for Cold Rolled Steel.

It is stated that the Wilmot & Hobbs Manufacturing Company, of Bridgeport, Conn., makers of cold rolled sheet and strip steel, which is used largely for all difficult pressed, stamp and drawn work, have just received a large United States government contract for this material for use in the manufacture of United States mail lock hardware. This order was placed with them, it is said, after a trial of various makes of cold rolled steel for this special work, extending over quite a period of time, and that the government adopted what the Wilmot & Hobbs Manufacturing Company, term their "extra special" stamping and drawing steel, as being the best for the purpose.

This company has recently purchased the hot rolling mill plant of the Bridgeport Rolling Mill Company, thus giving them additional facilities for preparing their special billets for their cold rolling mills. This brings their annual capacity up to about 15,000 to 20,000 tons of hot and cold rolled strip steel.

Mr. Albert N. Stanton, formerly principal owner and general manager of the Bridgeport Rolling Mill Company, has been engaged to manage this department of their works.

AN ELECTRICAL LIBRARY.

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A Comprehensive, Carefully Selected, yet Inexpensive, List of Instructive Electrical Books.

In response to the many inquiries from all parts of the country as to the best books for those who are desirous of becoming posted in the rudiments of Electricity in its various branches, and in an endeavor to afford beginners as wide a range of reading as possible for a comparatively small outlay, the Book Department of the **ELECTRICAL REVIEW PUBLISHING COMPANY** makes the following offer:

We will send by *express, prepaid* on receipt of **$15.00,** fourteen books by the most popular authors, especially adapted for a course of elementary reading, including the **ELECTRICAL REVIEW** for one year, as follows:

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THE DYNAMO, - - - By *Bottone*

ELECTRIC BELLS AND ALL ABOUT THEM, - - By *Bottone*

ELECTRICITY FOR ENGINEERS, By *Desmond*

THE TELEPHONE, - - By *Dolbear*

ALTERNATE CURRENT MACHINERY, - - - By *Kapp*

INCANDESCENT ELECTRIC LIGHTING, - - - - - By *Latimer*

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The price of the above list is $18.00 *and, aside from the saving on cost, the student has the benefit of an unexcelled selection from which he can derive the best practical results.*

REMEMBER: $15.00 buys all of the above, delivered to your office or residence.

KINDRED INTERESTS

Locke Brothers, Salem, Mass., have sent out a new and interesting catalogue descriptive of the famous Locke steam appliances.

The Clark Electric Company, 192 Broadway, New York, have recently issued some very handsome printed matter referring to the Clark system of arc lighting.

The Blauvelt Manufacturing Company, 353 Adams street, Brooklyn, have a well equipped plant for making all kinds of light machinery, model and experimental work.

The Jos. Dixon Crucible Company, Jersey City, N. J., have issued a tastefully printed little leaflet entitled "What Constitutes the Best Paint?" The letterpress is interesting.

The International Okonite Company, Limited, has issued through its English branch a very handsome and complete descriptive price list of these famous products. The pamphlet is printed in colors and ranks well with similar work done on this side of the water.

The Interior Conduit and Insulation Company, 44 Broad street, New York, have issued a cautionary notice to architects, builders, owners and others, setting forth that this company is the founder of the interior conduit system and that others are trespassers on their rights.

Houliston, Hubbard & Company, Neave Building, Cincinnati, O., is the name of a new firm which will deal in electrical supplies and patented specialties. Mr. Hubbard has been connected with the Thomson-Houston Company and Post & Company and is a gentleman of experience.

The National Pipe Bending Company, of New Haven, Conn., are putting a large number of their heaters into electric light plants throughout the country. They have just shipped two 1,000 horse-power and one 500 horse-power heaters to Pittsburgh and Baltimore, and have orders now in hand for four others ranging from 200 to 500 horse-power.

Messrs. Hutchinson Brothers, the well-known electrician of Hartford, Conn., have recently perfected a new style of arc lamp for working on arc and incandescent circuits, which promises to surpass anything heretofore put on the market. All the preliminaries for their manufacture are completed, and a full description of the novel features of this lamp will soon appear in the columns of the REVIEW.

The Dwight Slate Machine Company, of Hartford, Conn., are now putting on the market a new automatic gear cutting machine, which will cut to eight inch diameter, six pitch and finer. Some of these machines have already been shipped on foreign orders and others are now in hand for domestic use. They have also brought out a new drilling machine which is capable of drilling holes as fine .06 through ⅜ steel. The automatic feed drills are arranged in gangs of 6 to 12 spindles and are fitted with a new patentable relief device for clearing the drills. One operator can attend to six spindles and drill 7,000 holes per day. Some of these machines have been shipped to O. J. Faxon & Company, of Boston, for drilling piano tuning pins.

Chas. A. Schieren & Company, the well-known belt manufacturers of this city, have received a letter from the Bradford, Pa., Electric Light and Power Company, in which appears the following:

"We have seven of your belts in use, six 10 inch and one 13 inch, all driving arc and incandescent machines. By mistake in changing switches on incandescent switchboard, we put our No. 1 and 2 circuit, a total of 1,080 lights, on a 650 light machine driven by a 10 inch belt; it held the load about 10 minutes, when clutch on shafting began to slip. In changing switch again, another mistake was made, and all the lights on 1, 2, and 3 circuits were thrown onto a 1,300 machine, overloading the dynamo by about 700 lights; this machine is driven by a 13 inch belt; it also done its work for 10 minutes, when it came off the pulley. Have just given order to your Mr. Atherley for 53⅓ feet of 10 inch belt."

The Short Electric Railway Company announces for February business orders for original equipment or for additional apparatus from Beatrice Rapid Transit and Power Co., Beatrice, Neb.; Janesville Street Railway Co., Janesville, Wis.; The Spokane and Montrose Motor Railroad Co., Spokane Falls, Wash.; The Bloomington City Electric Railway Co., Bloomington, Ill.; The East Liverpool and Wellsville Street Railroad Co., East Liverpool, Ohio; The Braddock Electric Railway Co., Braddock, Pa.; The Georgetown and Tenallytown Railway Co., Washington, D. C.; The West End Street Railway Co., Rockford, Ill.; The Jamestown Street Railway Co., Jamestown, N. Y.; The South Covington and Cincinnati Street Railway Co., Cincinnati, Ohio; The Lincoln Street Railway Co., Lincoln, Neb.

FOR SALE—Ten horse-power Baxter Motor, nearly new; price, $400.

ERLANGER BROS.,
519 W. Pratt St., BALTIMORE, MD.

FOR SALE.

Two No. 20 500 volt Edison Railway Generators, 65 horse-power, complete, with regulating devices and in perfect working order, for $1,625 each.

Three No. 10 220 volt Edison Dynamos complete, with regulating devices and in perfect order, for $700 each.

One Hawkeye 220 volt dynamo 200 amperes for $500.

One Hawkeye 220 volt dynamo 150 amperes for $350.

Three Baldwin Steam Dummy Locomotives, from eight to eleven tons, two for $500 each—one good as new for $2,500, all of them were in daily use last summer.

Address,

Davenport and Rock Island Railway Co.,
DAVENPORT, IOWA.

FOR SALE.

QUICK, FOR CASH—One 16 inch by 16 inch, latest type, 150 Horse-Power Ball Engine, has been in temporary use three months and is without scar or blemish, and so guaranteed by the makers and by ourselves.

J. W. PARKER & CO.,
38 South Fourth St., Philadelphia, Pa.
PHILADELPHIA AGENTS BALL ENGINE.

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PART OF STORE on Fulton Street, adjoining new *Mail and Express* building, good light, steam heated, Edison wire in building. Space about 750 square feet.

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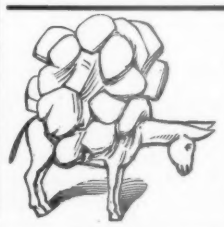

Overloaded and disordered Batteries are a common and painful sight. Why? Because they are not built to work, but to sell. Are you a sufferer? Then substitute the LAW BATTERY and suffer no more.

SOLE MAKERS,
LAW TELEPHONE CO.,
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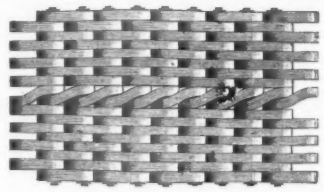
NEW YORK.

OFFICE OF THE LIGHT-HOUSE ENGINEER, THIRD DISTRICT.
TOMPKINSVILLE, N. Y., March 28, 1892.

SEALED PROPOSALS will be received at this office until 12 o'clock M., Monday, the 25th day of April, 1892, for furnishing Miscellaneous Articles for the Light-House Establishment. The articles needed consist of twenty numbered lots, embracing, respectively, Charcoal and Cumberland Coal; Building Material; Engineers' Supplies; Hardware, Tools, etc.; Iron and Steel; Belting; Graphite Paints, etc.; Lumber; Boiler Covering; Plate Glass; Galvanized and Russia Sheet Iron, Tin, Solder, Sheet Zinc and Iron Wire; Sheet Brass and Copper; Composition, Brass and Nickel Castings; Bells; Acids; Iron Castings; Sheet-Iron Smokestacks for Boilers; Electroplating Supplies; Shooks for Oil Supply-Boxes; and Miscellaneous Articles; all of which are enumerated in the specifications attached to the form of bid, which may be obtained on application to this office. Samples may be seen or information obtained at this office concerning any article not sufficiently described in the specifications. Bids will be received for one or more numbered lots complete. Envelopes containing proposals should be indorsed "Proposals for Miscellaneous Articles." The right is reserved to reject any or all bids, to strike out any item or items in the specifications, and to waive any defects. Bidders are invited to be present at the opening of proposals. D. P. HEAP, *Major of Engineers, U. S. A., Engineer Third Light-House District.*

LEATHER LINK BELTING.



Pat. "American Joint."

SEND FOR REDUCED PRICES.

American Leather Link Belt Co.,
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Engine Lathes, 10 in. x 4 ft.; 11 in. x 5 ft.; 12 in. x 6 ft.; 14 in. x 6 ft.; 16 in. x 6 ft.; 18 in. x 8 ft.; 20 in. x 8 ft., with tapes attachment; 22 in. x 12 ft. and 14 ft.; 24 in. and 26 in. x 16 ft.; 30 in. x 20 ft. and 18 ft.; 36 in. and 38 in. x 20 ft.; 42 in. x 12 ft.; 56 in. x 18 ft.; 72 in. x 20 ft.; 108 in. x 22 ft. Fox Lathes, 13 in. x 5 ft.; 14 in. x 5 ft.; 15 in. x 6 ft., 18 in. x 6 ft. Turret Lathes, 12 in. x 5 ft.; 14 in. x 5 ft.; 15 in. and 16 in. x 6 ft.; 18 in. x 6 ft.; 36 in. x 8 ft.

Planers, 16 in. x 16 in. x 3 ft.; 20 in. x 20 in. x 4 ft.; 24 in. x 24 in. x 6 ft.; 30 in. x 30 in. x 6 ft.; 36 in. x 36 in. x 10 ft.; 42 in. x 42 in. x 12 ft.; 72 in. x 60 in. x 15 ft.; 72 in. x 60 in. x 20 ft.

Friction Shapers, 15 in., 16 in., 20 in., 22 in., 32 in.

Crank Shapers, 6 in., 8 in., 10 in., 12 in., 15 in., 16 in., 20 in., 24 in., 28 in.

Screw Machines, Nos. 1, 2, 3, 4, with or without Wire Feed.

Screw Machines, Nos. 5, 6, 7, 8, Power Feed.

Presses, Nos. 51, 52, 53, Ferracute, Nos. 1, 2, 3, Stiles & Parker.

5 Lincoln Pattern Millers, No. 2.

Hand Millers, Nos. 1 and 2. 3 Cam Cutters.

Bolt Cutters, ¼ in. to 1 in., ½ in. to 2 in.

2 Profiling Machines. 1 36 in. and 48 in. Gear Cutter.

C. D. and E. Horizontal Boring Machine. Newark Machine Tool Co.

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AN ADJUSTABLE HAMMER

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(SUCCESSORS TO HAY-HORN MFG. CO.)
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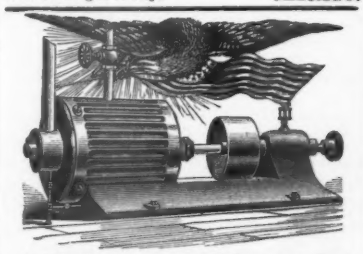
New Catalogue Ready. CHICAGO.



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ELECTRICAL PATENTS

INDEX OF INVENTIONS FOR WHICH LETTERS PATENTS OF THE UNITED STATES WERE ISSUED ON MARCH 16, 1892.

471,100 Electrically controlled elevator; Andrew M. Coyle, Washington, D. C., assignor to Nelson Hiss, Baltimore, Md.

471,130 Thermostatic instrument; Morris Martin, Malden, Mass.

471,151 Trolley wire support; Elmer A. Sperry, Chicago, Ill.

471,155 Alternating current motor; Elihu Thomson, Swampscott, Mass., assignor to the Thomson-Houston Electric Co. of Connecticut.

471,182 Thermostatic regulator; Edwin C. Merrill, Allegheny, Pa.

471,190 Carbon holder for arc lamps; Charles A. Pfluger, Chicago, Ill., assignor, by direct and mesne assignments, to the Standard Electric Co., of Illinois.

471,206 Trolley pole catcher; Moutraville M. Wood, Chicago, Ill.

471,210 Electric striking mechanism for clocks; Silas C. Dickinson, Corning, Iowa.

471,230 Electric railway signal; Edgar C. Wiley, Bristol, Tenn., assignor of two-thirds to James A. Dickey and Napoleon B. Ainsworth, same place.

471,234 Electric arc lamp; Hector Dewar, Boston, Mass., assignor to Albert W. Rounds, same place.

471,237 Vibrating electric switch; Jacob S. Gibbs, Hartford, Conn.

471,242 Electrically welding metals; Auguste de Nieritens, Paris, France, assignor, by mesne assignments, to the Thomson Electric Welding Co., Boston, Mass.

471,271 Electric switch; Amandus Metzger, New York, N. Y.

471,296 Electric signal for railways; Eugene T. Turney, Chicago, Ill.

JOHN A. BARRETT,
ELECTRICAL ENGINEER & EXPERT,
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BIDS FOR PUBLIC LIGHTING.

One, three and five year bids for lighting the streets and city buildings of the City of Burlington, Iowa, with sixty (60) or more arc lights of 2,000 candle-power each, and 250 or more incandescent lights of 20 or more candle-power each, will be received at the office of the City Clerk until April 18, 1892.

All bids to be accompanied by a good and sufficient bond in the sum of $5,000 for the faithful performance of the bid.

The Council reserves the right to reject any or all bids.

HENRY RITTER,
Chairman of Gas Committee.

Burnley Dry Battery

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STRONGER than any Open Circuit Battery on the Market. **BETTER** than any other Dry Battery yet produced. Most compact in size and cheapest. 90 cents per cell. Discount to the Trade and in quantities.

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